Plandemic COVID Conspiracy | Superstition and Real Estate | Nigerian Witchcraft Deaths | Dawkins Award | Mystery of Coughlan's Coffin

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON Vol. 44 No. 5 | September/October 2020

INTELLECTUAL HUMILITY: A GUIDING MAP FOR SKEPTICS

Skepticism and Pseudoexperiments
Creationists Continue Assault on Science

Cognitive Bases in UFO Reports of the Southwest

Evolution Education: A Twelve-Year Change

When Environmentalism Clashes with Science

10
0 09281 02614 3

Committee for Skeptical Inquiry www.skepticalinquirer.org

Robyn E. Blumner,* President and CEO
Barry Karr,* Executive Director

Joe Nickell, Senior Research Fellow
Massimo Polidoro, Research Fellow

Benjamin Radford, Research Fellow
Richard Wiseman, Research Fellow

Fellows

James E. Alcock,* psychologist, York Univ., Toronto
Marcia Angell, MD, former editor-in-chief, *New England Journal of Medicine*
Kimball Atwood IV, MD, physician; author; Newton, MA
Banachek, professional magician/mentalist, magic consultant/producer
Stephen Barrett, MD, psychiatrist; author; consumer advocate, Pittsboro, NC
Robert Bartholomew, sociologist, investigative journalist, Auckland, New Zealand
Irving Biederman, psychologist, Univ. of Southern California
Susan Blackmore, visiting lecturer, Univ. of the West of England, Bristol
Sandra Blakeslee, science writer; author; *New York Times* science correspondent
Mark Boslough, physicist, Albuquerque, NM
Henri Broch, physicist, Univ. of Nice, France
Jan Harold Brunvand, folklorist; professor emeritus of English, Univ. of Utah
Sean B. Carroll, molecular geneticist; vice president for science education, Howard Hughes Medical Institute, Madison, WI
Thomas R. Casten, energy expert, Hinsdale, IL
John R. Cole, anthropologist; editor, National Center for Science Education
K.C. Cole, science writer; author; professor, Univ. of Southern California's Annenberg School of Journalism
John Cook, Center for Climate Change Communication, George Mason University, Virginia.
Frederick Crews, literary and cultural critic; professor emeritus of English, Univ. of CA, Berkeley
Richard Dawkins, zoologist, Oxford Univ.
Geoffrey Dean, technical editor, Perth, Australia
Cornelis de Jager, professor of astrophysics, Univ. of Utrecht, the Netherlands
Daniel C. Dennett, Austin B. Fletcher Professor of Philosophy and director of Center for Cognitive Studies, Tufts Univ.
Ann Druyan, writer and producer; CEO, Cosmos Studios
Sanal Edamaruku, president, Indian Rationalist Association and Rationalist International
Edzard Ernst, former professor of complementary medicine, University of Exeter
Kenneth Feder, professor of anthropology, Central Connecticut State Univ.
Krista Federspiel, science journalist, expert on complementary and alternative medicine, Vienna, Austria.
Kevin Folta, molecular biologist, professor and chair of Horticultural Sciences Department, University of Florida
Barbara Forrest, professor of philosophy, SE Louisiana Univ.
Andrew Fraknoi, astronomer, University of San Francisco
Kendrick Frazier,* science writer; editor, Skeptical Inquirer
Christopher C. French, professor, Department of Psychology, and head of the Anomalistic Psychology Research Unit, Goldsmiths College, Univ. of London
Julia Galef, host of the *Rationally Speaking* podcast; cofounder, Center for Applied Rationality, Berkeley, CA
Luigi Garlaschelli, chemist, Università di Pavia (Italy); research fellow of CICAP, the Italian skeptics group
Maryanne Garry, professor, School of Psychology, Victoria Univ. of Wellington, New Zealand
Susan Gerbic, founder and leader of Guerilla Skepticism on Wikipedia (GSoW) project
Thomas Gilovich, psychologist, Cornell Univ.
David H. Gorski, cancer surgeon and researcher at Barbara Ann Karmanos Cancer Institute and chief of breast surgery section, Wayne State University School of Medicine
Wendy M. Grossman, writer; founder and first editor, *The Skeptic* magazine (UK)
Susan Haack, Cooper Senior Scholar in Arts and Sciences, professor of philosophy, University of Miami
Harriet Hall, MD, physician; investigator, Puyallup, WA
David J. Helfand, professor of astronomy, Columbia Univ.
Terence M. Hines, prof. of psychology, Pace Univ., Pleasantville, NY
Douglas R. Hofstadter, professor of human understanding and cognitive science, Indiana Univ.
Gerald Holton, Mallinckrodt Professor of Physics and professor of history of science, emeritus, Harvard University
Deborah Hyde, skeptic, folklorist, cultural anthropologist, Editor in Chief, *The Skeptic* (U.K.)
Ray Hyman,* psychologist, Univ. of Oregon
Stuart D. Jordan, NASA astrophysicist emeritus
Barry Karr,* executive director, Committee for Skeptical Inquiry, Amherst, NY
Edwin C. Krupp, astronomer; director, Griffith Ob servatory, Los Angeles, CA
Lawrence Kusche, science writer
Stephan Lewandowsky, psychologist, School of Experimental Psychology and Cabot Institute, Univ. of Bristol, UK
Scott O. Lilienfeld, psychologist, Emory Univ., Atlanta, GA
Lin Zixin, former editor, *Science and Technology Daily* (China)
Jere Lipps, Museum of Paleontology, Univ. of California, Berkeley
Elizabeth Loftus, professor of psychology, Univ. of California, Irvine
Daniel Loxton, author; editor of *Junior Skeptic* at *Skeptic* magazine (US); artist, Vancouver, B.C., Canada
Michael E. Mann, Distinguished Professor of Atmospheric Sciences and director of the Earth Systems Sciences Center, Pennsylvania State University
David Marks, psychologist, City Univ., London
Mario Mendez-Acosta, journalist and science writer, Mexico City
Kenneth R. Miller, professor of biology, Brown Univ.
David Morrison, space scientist, NASA Ames Research Center
Richard A. Muller, professor of physics, Univ. of California, Berkeley
Joe Nickell, senior research fellow, CSI
Jan Willem Nienhuys, mathematician, Waalre, the Netherlands
Lee Nisbet, philosopher, Medaille College
Steven Novella, MD, assistant professor of neurology, Yale Univ. School of Medicine
Bill Nye, science educator and television host, Nye Labs, CEO, The Planetary Society
James E. Oberg, science writer
Paul Offit, professor of pediatrics, director of the Vaccine Education Center, the Children's Hospital of Philadelphia
Naomi Oreskes, geologist and professor, Departments of the History of Science and Earth and Planetary Sciences, Harvard Univ., Cambridge, MA
Loren Pankratz, psychologist, Oregon Health Sciences Univ.
Robert L. Park, emeritus professor of physics, Univ. of Maryland
Jay M. Pasachoff, professor of astronomy and director of Hopkins Observatory, Williams College
John Paulos, mathematician, Temple Univ.
Clifford A. Pickover, scientist; author; editor, IBM T.J. Watson Research Center.
Massimo Pigliucci, professor of philosophy, City Univ. of New York–Lehman College
Steven Pinker, cognitive scientist, Harvard Univ.
Massimo Polidoro, science writer; author; executive director of CICAP, Italy
James L. Powell, geochemist; author; executive director, National Physical Science Consortium
Anthony R. Pratkanis, professor of psychology, Univ. of CA, Santa Cruz
Donald R. Prothero, paleontologist/geologist, Natural History Museum of Los Angeles County, Los Angeles, CA
Benjamin Radford, investigator; research fellow, Committee for Skeptical Inquiry
James "The Amazing" Randi, magician; CSICOP founding member; founder, James Randi Educational Foundation
Milton Rosenberg, psychologist, Univ. of Chicago
Amardeo Sarma,* chairman, GWUP, Germany
Richard Saunders, Life Member, Australian Skeptics; educator; investigator; podcaster; Sydney, Australia
Joe Schwarcz, director, McGill Office for Science and Society
Eugenie C. Scott,* physical anthropologist; chair, advisory council, National Center for Science Education
Seth Shostak, senior astronomer, SETI Institute, Mountain View, CA
Simon Singh, science writer; broadcaster; UK
Dick Smith, entrepreneur; publisher; aviator; adventurer, Terrey Hills, N.S.W., Australia
Keith E. Stanovich, cognitive psychologist, professor of applied psychology, Univ. of Toronto
Karen Stollznow, linguist; skeptical investigator; writer; podcaster
Jill Cornell Tarter, astronomer, SETI Institute, Mountain View, CA
Carol Tavris, psychologist and author, Los Angeles, CA
David E. Thomas, physicist and mathematician, Socorro, NM
Neil deGrasse Tyson, astrophysicist and director, Hayden Planetarium, New York City
Indre Viskontas, cognitive neuroscientist; TV and podcast host; opera singer, San Francisco, California
Stuart Vyse,* psychologist, former Joanne Toor Cummings '50 professor of psychology, Connecticut College
Marilyn vos Savant, *Parade* magazine con-trib uting editor
Steven Weinberg, professor of physic s and astronomy, Univ. of Texas at Austin; Nobel laureate
E.O. Wilson, Univ. professor emeritus, organismic and evolutionary biology, Harvard Univ.
Richard Wiseman, psychologist, Univ. of Hertfordshire, England
Benjamin Wolozin, professor, Department of Pharmacology, Boston Univ. School of Medicine

*Member, CSI Executive Council
(Affiliations given for identification only.)

The Skeptical Inquirer (ISSN 0194-6730) is published bi-monthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

Inquiries from the media and the public about the work of the Committee should be made to Barry Karr, Executive Director, CSI, P.O. Box 703, Amherst, NY 14226-0703. Tel.:716-636-1425. Fax: 716-636-1733. Email: bkarr@centerforinquiry.org.

Manuscripts, letters, books for review, and editorial inquiries should be sent to Kendrick Frazier, Editor, Skeptical Inquirer, email: kendrickfrazier@comcast.net. Mail: 944 Deer Drive NE, Albuquerque, NM 87122. Please consult our Guide for Authors for style, reference, and submittal instructions. It is on our website at www.skepticalinquirer.org/article-submission-guidlines/.

Articles, reports, reviews, and letters published in the SKEPTICAL INQUIRER represent the views and work of individual authors. Their publication does not necessarily constitute an endorsement by CSI or its members unless so stated.

Copyright ©2020 by the Center for Inquiry and the Committee for Skeptical Inquiry. All rights reserved.

Subscriptions and changes of address should be addressed to: SKEPTICAL INQUIRER, P.O. Box 703, Amherst, NY 14226-0703 or call toll-free 1-800-634-1610 (outside the U.S. call 716-636-1425). Old address as well as new are necessary for change of address, with ten weeks advance notice. Skeptical Inquirer subscribers may not speak on behalf of CSI or the Skeptical Inquirer.

Postmaster: Send changes of address to Skeptical Inquirer, P.O. Box 703, Amherst, NY 14226-0703.

cfi A PROGRAM OF CENTER FOR INQUIRY

Skeptical Inquirer September/October 2020 | Volume 44 No. 5

FEATURES

32
Intellectual Humility: A Guiding Principle for the Skeptical Movement?

Intellectual humility is a virtue that can and should be a unifying principle for skeptics.

SCOTT O. LILIENFELD, ADELE N. STROTHER, SHAUNA M. BOWES, AND THOMAS H. COSTELLO

38
Skepticism and Pseudoexperiments

Pseudoscience is often discussed in skeptical circles. But a related issue, pseudoexperiments, is common, less recognized, and possibly as pernicious.

BENJAMIN RADFORD

43
The Continuing Assault on Science by Creationist Group Reasons to Believe

Christian ministry Reasons to Believe promotes old-earth biblical creationism by shunning unsupportive evidence, enshrining supernatural causation, and transgressing scientific logic.

BRIAN BOLTON

46
Magic in the House of Rain: Cognitive Bases of UFO 'Observations' in the Southwest Desert

Popular culture frequently conflates Native American beliefs with UFO ideas, certainly—and perhaps especially—in the Southwest desert. An experimental study demonstrates mechanisms of this bizarre concept.

MATTHEW SHARPS, SIMRAN NAGRA, SETH HURD, AND ALEXIS HUMPHREY

50
What Are the Chances?

Because they are erroneously perceived as having extremely low probability, cases of significant, unusual coincidence are often cited as evidence for the paranormal. The true probabilities are almost always much higher than initially supposed.

TONY PASQUARELLO

SPECIAL REPORT

14
Evolution Education: What a Difference a Dozen Years Makes!

GLENN BRANCH

INTERVIEW

28
Six Degrees Author Mark Lynas on Our Warming World

AMARDEO SARMA

COMMENTARY

54
When Environmentalism Clashes with Science

DIBAKAR DAS

COLUMNS

FROM THE EDITOR
The State of Our Nation 4

NEWS AND COMMENT
Plandemic Conspiracy Video Goes Viral, Sells Books / Richard Dawkins Award Goes to Writer-Lyricist Javed Akhtar / CSICon 2020 Conference Postponed for a Year; Online Lecture Series Replaces It / Judge Dismisses CFI Suit against Walmart on Homeopathy; Appeal Planned / Accused Witches Burned, Killed in Nigeria / Quoteworthy: Dr. Fauci on Antiscience Bias / CFI Investigations Group Raises Paranormal Challenge to $250,000 / One of World's Most Active Groups, Australian Skeptics Observe Fortieth Anniversary / APS Creates Distinguished Award in Lilienfeld's Name 5

INVESTIGATIVE FILES
The Incredible Saga of Coghlan's Coffin
JOE NICKELL 16

REALITY IS THE BEST MEDICINE
How a Drug Is Born
HARRIET HALL 18

BEHAVIOR & BELIEF
Are You Afraid of the Thirteenth Floor? Superstition and Real Estate, Part 2
STUART VYSE 21

SKEPTICAL INQUIREE
Being Skeptical about Initial Skepticism
BENJAMIN RADFORD 26

NEW AND NOTABLE 59

LETTERS TO THE EDITOR 61

THE LAST LAUGH 66

REVIEWS

Turning Magical Thinking into the Magic of Critical Thinking
JOE NICKELL 56
Strange but True: 10 of the World's Greatest Mysteries Explained
by Kathryn Hulick

How Does It Feel?
PETER KASSAN 57
The First Minds: Caterpillars, 'Karyotes, and Consciousness
by Arthur S. Reber

Committee for Skeptical Inquiry
"… promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

The State of Our Nation

Well, here we are. Our country in chaos. The COVID-19 pandemic wreaks havoc across the planet, and the United States, without leadership, fares worse than any other nation. Just as cases were going nicely down, cities, states, beaches, and bars reopened. We ignored all scientific advice and fell right back into full pandemic once again. We are now a pariah among nations. European countries won't let us in, and who can blame them?

Another white cop kills another black man, this time for an agonizing eight minutes forty-six seconds on video, and the country explodes, first into justifiable anger and unfortunate riots, and then into enormous and inspiring peaceful protests in all fifty states. (See CFI's online statement about that.)

Minds change. Confederate statues fall. White Americans have suddenly learned lessons that Black Americans have lived with their whole lives. Our nation's original sin of slavery and the racism and prejudices that persist today continue to haunt us all.

And what have we heard from the top? No healing words. Just more messages stoking fear and division. And about the pandemic? Lies, wishful thinking, magical thinking, childish thinking, conspiratorial thinking, no thinking at all. A country that used to pride itself on its scientific and technological leadership can't even muster a rational national strategy to fight the pandemic.

What are we scientific skeptics to do? What we have always done. Emphasize facts and evidence. Support reason and rationality. Honor those who do the same (see Dr. Fauci on antiscience denialism, Quoteworthy, p. 9). Fight for good science. Fight against lies, misinformation, ignorance, exaggerations, deceptions, willful ignorance, pseudoscience, antiscience, and conspiracy theories—whether the whacko ideas come from the neighbor down the street or the man in the White House.

We are not a partisan organization. We extol science and reason. We promote education and critical thinking. We seek to understand our own biases, our often flawed thinking. We expose misinformation, wherever it originates. That's not partisan. But when the source of so much unabashed nonsense exacerbating our real problems and threatening our very democracy comes from the president and his cronies, we owe it to ourselves to acknowledge that fact as well.

* * *

The Skeptical Inquirer has always served as a forum for discussion of issues important to science-minded skeptics. Our two lead articles are in that vein. In the first, our esteemed colleague Scott O. Lilienfeld and three Emory University psychology colleagues consider the perennial debate over how skeptics should best deal with proponents of unsupported assertions: kind and gentle so as to persuade or full-on attack—or a mixture, depending on circumstances. (I have always supported a mixture of approaches.) They seek a codifying principle of skepticism in that regard, and they propose one: *intellectual humility*. They make a good case, and I'll be interested in your thoughts about their argument. Likewise, Ben Radford points out the dangers of pseudoexperiments, often carried out by well-meaning television programs or on social media with staged demonstrations that seldom prove anything useful and can be misleading and even pernicious. We'd be better off without them.

—Kendrick Frazier

Skeptical Inquirer™
THE MAGAZINE FOR SCIENCE AND REASON

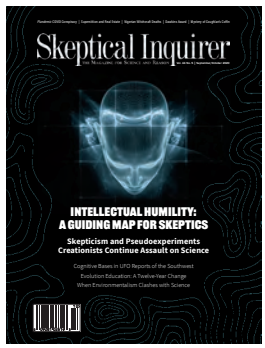
EDITOR Kendrick Frazier
DEPUTY EDITOR Benjamin Radford
MANAGING EDITOR Julia Lavarnway
ASSISTANT EDITOR Nicole Scott
ART DIRECTOR Christopher Fix
Magazine layout and cover design of this issue by Alexander Nicaise
WEBMASTER Marc Kreidler
PUBLISHER'S REPRESENTATIVE Barry Karr

EDITORIAL BOARD James E. Alcock, Robyn E. Blumner, Harriet Hall, Ray Hyman, Barry Karr, Scott O. Lilienfeld, Elizabeth Loftus, Joe Nickell, Amardeo Sarma, Eugenie C. Scott, David E. Thomas, Leonard Tramiel, Stuart Vyse

CONTRIBUTING EDITORS Harriet Hall, David Morrison, Joe Nickell, Matthew C. Nisbet, Massimo Polidoro, David E. Thomas, Stuart Vyse, Mick West, Richard Wiseman

Published in association with
CENTER FOR INQUIRY

CHAIR Edward Tabash
PRESIDENT AND CEO Robyn E. Blumner
CHIEF FINANCIAL OFFICER Barry Karr
CORPORATE COUNSEL Nicholas J. Little, Brenton Ver Ploeg
SUBSCRIPTION DATA MANAGER Jacalyn Mohr
COMMUNICATIONS DIRECTOR Paul Fidalgo
DIRECTOR OF LIBRARIES Timothy S. Binga
EXECUTIVE DIRECTOR, RICHARD DAWKINS FOUNDATION FOR REASON & SCIENCE Robyn E. Blumner
DIRECTOR OF DEVELOPMENT Connie Skingel
DIRECTOR OF MARKETING Cameron Popp
DIRECTOR, DIGITAL PRODUCT AND STRATEGY Marc Kreidler
DIRECTOR, GOVERNMENT AFFAIRS Jason Lemieux
SYSTEM ADMINISTRATOR Cody Hashman
DIRECTOR, TEACHER INSTITUTE FOR EVOLUTIONARY SCIENCE Bertha Vazquez
BOARD OF DIRECTORS Edward Tabash (chair), Vinod Bhardwaj, David Cowan, Richard Dawkins, Brian Engler, Kendrick Frazier, Barry A. Kosmin, Bill Maxwell, Y. Sherry Sheng, Julia Sweeney, J. Anderson Thomson Jr., Leonard Tramiel. *Honorary:* Rebecca Newberger Goldstein, Susan Jacoby.
STAFF Pat Beauchamp, Melissa Braun, Matthew Cravatta, Leslie Fineberg, Roe Giambrone, Melissa Myers, Alexander Nicaise, Paul Paulin, Michael Powell, Vance Vigrass



cfi CENTER FOR INQUIRY
CFI Mission: The Center for Inquiry strives to foster a secular society based on reason, science, freedom of inquiry, and humanist values.
Our Vision: A world where people value evidence and critical thinking, where superstition and prejudice subside, and where science and compassion guide public policy.
Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

Plandemic Conspiracy Video Goes Viral, Sells Books

Benjamin Radford

Plandemic creator Mikki Willis. Source: YouTube

In early May, a YouTube video titled *Plandemic* was released by Mikki Willis (credited onscreen as "father/filmaker"[*sic*]). It featured a lengthy interview with virologist Judy Mikovits, who offered scattershot conspiracy-laden assertions about the "truth" behind the COVID-19 pandemic, prefaced by claims of having been framed for a crime (she was charged with theft in 2011) and accusations of government coverups going back decades involving various medical authorities, including Dr. Anthony Fauci.

Willis's voiceover gravely warned that "for exposing their deadly secrets, the minions of Big Pharma have waged war on Dr. Mikovits," who in the film (and in her new book) "bravely" reveals "the plague of corruption that places all human life in danger."

Dozens of claims appeared in the twenty-six-minute video, some of which are unverifiable—as conspiracy theories tend to be. But many statements made by Mikovits have been investigated and proven to be misleading or simply false. Within weeks, the video was widely shared on social media, often by ostensibly non-conspiracy promoters who were "just asking questions." The video was soon identified as containing dangerous misinformation by social media platforms, including Facebook and YouTube, and removed. This in turn reinforced the idea that the views were being silenced and censored by Big Pharma, Big Tech, or some other sinister, shadowy Big Something.

Questions about false and misleading claims in *Plandemic* were soon raised by journalists for publications, including the *Washington Post* and the *Atlantic*, as well as Politifact. Working with Barry Karr and Paul Fidalgo, I reviewed the video and, in collaboration with Dr. Paul Offit, composed a list of eight simple questions about claims made in the video (see sidebar). Fidalgo contacted Willis, who agreed in writing to respond to our questions. The Center for Inquiry waited several days for a response and then followed up with a query asking Willis to confirm he received the questions and would be offering answers as agreed. No response has been forthcoming.

If the claims made by Mikovits and Willis in *Plandemic* are based in truth and facts, you'd think they would be eager to offer evidence supporting their claims. What better way to turn the tables on scientists, skeptics, and journalists than to offer a referenced, fact-based, point-by-point rebuttal to critics who offer them a platform? We have to wonder: Where are their responses? Why are they so quiet after repeated claims of silencing? Why are they afraid to answer questions?

Perhaps the answer is simple: *Plandemic* was never about finding truth but instead a wildly successful publicity stunt for both Mikovits's book *Plague of Corruption: Restoring Faith in the Promise of Science* (which soon topped best-seller lists) and a future full-length feature documentary.

Benjamin Radford is the deputy editor of the Skeptical Inquirer and a CSI research fellow.

Sample Questions for *Plandemic* Filmmakers

• The *Plandemic* video claims that facemasks "activate" coronaviruses, including SARS-CoV-2. What scientific evidence do you have that the virus is more infectious for individuals wearing masks than for those not wearing masks?

• The video claims that during the COVID-19 outbreak, beaches should be opened to the public because "You've got … healing microbes in the ocean and the salt water." However, because bacteria don't kill viruses, how would "healing microbes" reduce or treat coronavirus infection?

• The video promotes hydroxychloroquine as effective against the virus (despite elevated cardiac risks and several placebo-controlled studies finding no efficacy at all). Instead of being ignored or suppressed by the medical establishment, controlled clinical trials of the drug *have* been performed. What is the "thousands of pages of data" already demonstrating the drug's safety and efficacy referred to in the video?

• The video claims that the plan is "to prevent the therapies until everyone is infected, then push the vaccines." Yet no vaccines are available, and if everyone is infected then a vaccine wouldn't be needed. If the pandemic were part of a scheme to sell a vaccine (or force it on the public), why wouldn't it have been developed *before* the virus was released and hundreds of thousands of potential customers (sure to pay anything to stay alive) had already died? Can you clarify your logic?

Richard Dawkins Award Goes to Writer-Lyricist Javed Akhtar

Paul Fidalgo

For half a century, India's Javed Akhtar has been a powerful force for secularism, reason, and human rights, challenging superstition and intolerance through his work in poetry, film, and political activism. To honor his decades of work on behalf of these crucial values, Akhtar is the 2020 recipient of the Richard Dawkins Award. Akhtar will receive the award from Richard Dawkins—virtually—in an online event in October.

The Richard Dawkins Award is presented annually by the Center for Inquiry, home to the Richard Dawkins Foundation for Reason & Science. It is given to "a distinguished individual from the worlds of science, scholarship, education, or entertainment who publicly proclaims the values of secularism and rationalism, upholding scientific truth wherever it may lead."

As a screenwriter, Akhtar has penned some of India's most popular and acclaimed films, earning multiple awards for screenplays and lyrics. As a poet and social commentator, Akhtar has inspired millions with calls to reject religious fundamentalism in favor of education and equal rights for all. He has been honored by his country with the prestigious Padma Bhushan for "distinguished service of a high order" and nominated to the Rajya Sabha of India's Parliament.

Born into a Muslim family, Akhtar came to embrace science and rationality over religious dogma. Responding to the question of why he considers himself an atheist, he said, "The answer is very simple: because I think." Still, Akhtar maintains a connection to his community, as a founding member of the anti-fundamentalist organization Muslim Intelligentsia and president of Muslims for Secular Democracy. "When socio-political situations are created by the people who pretend to be religious and are using religion to get mileage or take some kind of control over a segment of our society, I will protest, as I belong to that community," said Ahktar in 2007. "I may be an atheist but I am an atheist Muslim."

Richard Dawkins, founder of the Richard Dawkins Foundation for Reason & Science and a member of the Board of Directors of the Center for Inquiry (CFI), noted that "As India is being pulled between its secular foundations and convulsions of dangerous religious nationalism, Javed Akhtar's voice is more necessary and more vital than ever." Dawkins informed Akhtar of the award on behalf of CFI. "Akhtar is a bright light for reason, freethought, and atheism in a dark time, and we are delighted to honor him with the Richard Dawkins Award," Dawkins said.

News of the award spread quickly throughout India. Within a single day, scores of media outlets had reported on it. Soon the numbers reached hundreds if not thousands. "I am deeply honored," said Akhtar. "I have been a great admirer of Richard Dawkins ever since I read his first book *The Selfish Gene*." He called Dawkins a "fierce advocate" of empirical science over superstition and said he has read all Dawkins's books. "His books have strengthened my own views on the need to expose religious dogma as an enemy of critical thinking and rationality."

Akthar's wife, veteran actor Shaban Azmi, touted the award as especially relevant in the current times when secularism is under attack. "I am thrilled. I know what a hero Richard Dawkins has been for Javed. … When secularism is being attacked by religious fundamentalists of all hues, this award comes as a validation of Javed's long service to rational thinking," she told the Indian news agency PTI.

Said inventor and entrepreneur Vinod Bhardwaj, a member of CFI's Board of Directors:

> We are excited to honor Javed Akhtar for his eloquence and courage in the fight against irrationality and superstition. As Akhtar has said, "Any stupidity accepted on a mass scale is faith. If a faith loses followers, it becomes stupidity again." It is my hope that, through his award, more people around the world will be inspired by the work of Javed Aktar, and more people in India will be inspired by the work of Richard Dawkins.

"CFI will hold a livestream awards presentation in October that will include an extended, online conversation between Javed Akhtar and Richard Dawkins," said Robyn Blumner, CFI's president and CEO. "We know there will be tremendous interest in India to watch these two great thinkers discuss a range of issues, and we look forward to introducing fans of Richard Dawkins in the United States and elsewhere to the brilliance and courage of Javed Akhtar."

Previous winners of the Richard Dawkins Award include philosopher and cognitive scientist Daniel Dennett, *Cosmos* cocreator Ann Druyan, activist and feminist Ayaan Hirsi Ali, and actor and writer Stephen Fry. In 2019, the award was given to comedian and actor Ricky Gervais.

Paul Fidalgo is the Center for Inquiry's communications director. This article includes input from several Indian news outlets.

CSICon 2020 Conference Postponed for a Year; Online Lecture Series Replaces It

The coronavirus pandemic claimed another victim when CSICon 2020, planned for October 15–18 in Las Vegas, had to be postponed until 2021. CSICon is the big conference on science and reason hosted annually over a four-day period in October in recent years by the Committee for Skeptical Inquiry and the Center for Inquiry.

The decision came in early June after long consideration of possible options. "I am sure it will come as no surprise to anyone that we felt holding a safe event at this stage of the pandemic was not really possible," Barry Karr, conference organizer and executive director of the Committee for Skeptical Inquiry, wrote in a June 8 email to CSICon speakers. The CFI board had discussed options at a June 4 board meeting, but it was already clear that full postponement was preferred.

It was decided not to hold a full online conference or even a stripped-down "CSICon Lite" version online. Instead, the hope is to present an online lecture series in the fall. It will be called Skeptical Inquirer Presents. You can register for the lecture series, which began July 30 with a talk on conspiracy theories and COVID 19, at https://skepticalinquirer.org/presents/.

The impressive roster of speakers that had been planned for the 2020 conference has been invited to return in 2021. CSICon 2021 is now scheduled for October 21–24, 2021, at the Flamingo Hotel in Las Vegas.

Judge Dismisses CFI Suit against Walmart on Homeopathy; Appeal Planned

A judge has dismissed a lawsuit filed by the Center for Inquiry (CFI) against Walmart for its marketing of homeopathic fake medicine. CFI says it will appeal.

In May 2019, CFI filed a lawsuit against Walmart, the world's largest retailer, accusing it of committing widescale consumer fraud and endangering the health of its customers through its sale and marketing of pseudoscientific homeopathic drugs. The suit accused Walmart of misrepresenting homeopathy's safety and efficacy by hawking homeopathic products right alongside real, evidence-based medicine on its shelves and in its online store, with no distinction between them. (See "Suing for Science" and "CFI Sues Walmart for Fraud …" in Skeptical Inquirer's special Health Wars issue, September/October 2019.)

On May 20, 2020, Judge Florence Pan of the District of Columbia Superior Court dismissed CFI's case, but CFI considers the grounds for dismissal dubious and bizarre.

First, Judge Pan claimed that the Center for Inquiry lacked standing as a consumer protection organization. That assertion is belied by the fact that for more than forty years the Committee for Skeptical Inquiry and Skeptical Inquirer magazine, both a part of CFI, have investigated and exposed pseudoscientific medical practices for the benefit of consumers. CFI has also helped educate the public about the dangers of pseudoscientific health products and advocated for stricter regulation of scientifically unproven health products with legal action and lobbying. CFI also now includes the website Quackwatch, an encyclopedic source of critical information for consumers about dubious health claims and products.

"The Center for Inquiry was explicitly founded for the very purpose on which Judge Pan says we have no standing," said Nick Little, CFI's vice president and general counsel. "Consumer protection is about more than recalls of unsafe toys. It's about stopping powerful corporations from abusing the trust of their customers and risking their health with deceptive practices. It's baffling to me that this judge refuses to see that."

Second, Judge Pan asserted that CFI failed to identify Walmart's specific actions that lead to harm to consumers. But CFI maintains that the harm could not have been more clear: By making no distinction between real and fake medicine, Walmart is profiting off consumers' confusion—confusion that is attested to in a recent survey on consumer attitudes toward homeopathic products and its retailers. (See "CFI Survey on Homeopathy: Consumers Feel Scammed by Walmart and CVS," SI, November/December 2019.)

"Walmart literally shelves its useless homeopathic products under signs that read 'cold and flu,' many of them packaged with Walmart's own private label branding, right next to real medicine," said Little. "Walmart creates the confusion in consumers' minds, and then benefits from that confusion. How much clearer can it be?"

CFI is currently waging a similar suit in the District of Columbia against the country's biggest pharmacy chain, CVS, again challenging the presentation and marketing of homeopathic products in their stores. CFI is currently awaiting the judge's decision on CVS's motion to dismiss in that case.

Accused Witches Burned, Killed in Nigeria

Leo Igwe

Although the burning of alleged witches is often identified with eighteenth-century Europe, this horrific violence still occurs in modern Africa. People in pre-colonial Africa used belief in witchcraft to make sense of misfortunes that defied naturalistic or commonsense explanations. Unfortunately, these ancient superstitious beliefs have neither waned nor disappeared over the years.

Colonialists tried to eradicate witch hunting and introduced legislation that prohibited witchcraft accusations. At the end of colonial rule, some African countries retained the colonial legislation against witchcraft persecutions. Other countries, however, introduced laws that formally recognized the reality of witchcraft, leading to a legal and political climate that has enabled rampant witch persecution, including recently in West Africa.

Some African countries introduced laws that formally recognized the reality of witchcraft, leading to a legal and political climate that has enabled rampant witch persecution.

Leo Igwe
Yesterday at 2:14 PM ·
These are not people who suffered some fire accident, no...they are some of the victims and survivors of witch burning in Cross River State last week. I spoke with one of them, the one lying on the bed, last night. My advocacy initiative AFAW plans to HELP the victims pay their medical bills. AFAW is overstretched in terms of resources If you would like to support those who survived this savage act, please contact me. #stopwitchpersecution
66
18 Comments 12 Shares

On May 19, 2020, at least fifteen people, most of them women, were set ablaze after being accused of witchcraft in Cross River State in southern Nigeria. This region is notorious for witch persecution that often targets children, though the victims in this case were adults. A local politician, Thomas Obi Tawo, masterminded the attack. Tawo, who goes by the name General Iron, is feared throughout the region and leads a local gang that terrorizes the community. Some people said that it was due to Tawo's powerful political position that the state governor of Cross River, Benedict Ayade, appointed him special adviser on Forest Security. Despite his appointed powers, this position made Tawo increasingly insecure, due to fears and anxieties surrounding alleged occult activities.

According to local sources, the relationship between Tawo and his relatives had been strained, and he had suspected

his mother and other family members of bewitching him. Tawo claimed that he saw the relatives in his dreams threatening to kill him. Last year, he confronted one of them, Chief Edward Kekong, and slapped him. In May, Tawo claimed that these family members had continued to appear and threaten him in his dreams. He complained to some of the family members, who agreed to consult some local diviners to confirm his suspicions. But Tawo claimed that he had consulted a man of God—as pastors are called in Nigeria—who validated his suspicion that his relatives wanted to harm him through witchcraft. He then decided to bring witch hunters to rid the community of these evil people.

On the day of the attack, Tawo arrived with thugs wielding machetes, clubs, and other weapons. A few of them were holding mirrors and other objects believed to identify witches. They moved from house to house, pointing out the alleged witches in the community. First, they went to the apartment of Thomas Obi Tawo's mother; they beat her, dragged her out of the home, and threw her into a fire. Then they went to the homes of other alleged witches and wizards and meted out the same treatment. By the time it ended, at least fifteen people suspected of witchcraft were assaulted and set ablaze. For hours, members of the community watched in shock as Tawo and his lynch mob terrorized the community.

The victims sustained various injuries and burns on their faces, backs, legs, and hands. Some are unable to urinate or even sit because the fire burned their genitals and buttocks. Relatives who had the financial means took victimized family members to nearby hospitals, while the poorest nursed their wounds as best they could at home. The wounds of one female victim who could not afford hospital care became infected, and people in the community contributed resources to rush her to a hospital. Three of the victims have died, and others are still in hospitals fighting for their lives.

A police outpost exists in Boki, where the attacks took place, but the police did not intervene. A complaint has been lodged with the state police command in Calabar. The police public relations officer stated that an investigation had begun, but there seems to be no significant progress. None of those responsible for the atrocity have been arrested, and police have yet to apprehend or interrogate any suspects, including Tawo.

The Cross River state government has been indifferent to the attacks and has refused to condemn such persecutions. The government has extended no support to the victims and has not committed itself to seeking justice. Instead, the state government has been accused of undermining the investigation and trying to ensure that Thomas Obi Tawo and other alleged perpetrators are not brought to justice. The state media spokesperson had stated that no member of the government was connected with the burning of witches in Boki. Advocacy for Alleged Witches (AFAW), an organization that campaigns against witch persecution in Africa, is in touch with surviving victims and is helping defray the costs of their medical treatment. AFAW is also pressuring the police to arrest and prosecute the perpetrators and fulfill their responsibility to prevent crimes and protect citizens. Until and unless state authorities protect the lives and properties of citizens accused of witchcraft, such persecutions and killings will continue.

Leo Igwe is a longtime humanist and human rights advocate in Nigeria and head of Advocacy for Alleged Witches.

DR. FAUCI ON ANTISCIENCE BIAS: 'IT'S AMAZING THE DENIAL THERE IS'

Source: Wikipedia

"One of the problems we face in the United States is that, unfortunately, there is a combination of an antiscience bias that people are—for reasons that sometimes are, you know, inconceivable and not understandable—they just don't believe science and they don't believe authority.

"So when they see someone up in the White House, which has an air of authority to it, who's talking about science, that there are some people who just don't believe that—and that's unfortunate because, you know, science is truth. And if you go by the evidence and the data, you are speaking the truth.

"It's amazing sometimes the denial there is. It's the same thing that gets people who are anti-vaxxers, who don't want people to get vaccinated, even though the data clearly indicate the safety of vaccines. That's really a problem.

"Science is the attempt in good faith to get to the facts, and it isn't perfect. What happens is that science can be self-correcting. The beauty of science is that it is self-correcting. ... There are so many other people independently who are asking the same questions that sooner or later something that really is true will get confirmed, time after time after time. ... As long as science is humble enough and open enough and transparent enough to accept the self-correction, it's a beautiful process."

Anthony Fauci, MD, director of the National Institute of Allergy and Infectious Disease, June 17, 2020, on a U.S. Department of Health and Human Services podcast, Learning Curve.

CFI Investigations Group Raises Paranormal Challenge Prize to $250,000

Paul Fidalgo

Can you read other people's thoughts? Can you move objects with your mind? Can you predict the future? More to the point, can you prove it? If you can, the Center for Inquiry Investigations Group (CFIIG) will give you $250,000.

For two decades, CFIIG has offered those who profess to have supernatural, paranormal, or occult abilities the opportunity to definitively prove their claims under mutually agreed upon testing conditions. For several years, the award for passing the CFIIG Challenge was $100,000, but no one has ever been able to claim the prize.

That award has now been raised to $250,000.

"We've been waiting for twenty years now for someone to come along and blow our minds. While many have tried, no one has proven they can actually do what they say they can do," said James Underdown, CFIIG founder and executive director of Center for Inquiry West in Los Angeles. "Maybe all the real superpowered folks were just waiting for us to raise the stakes. Hopefully, a quarter million bucks will do it."

"And just to help get the word out, we're also offering a $5,000 referral prize to the person who sends us a winning challenger," added Underdown. "So you don't even need to have magic powers to get some extra cash. You just have to know someone who does."

CFIIG was originally founded as the Independent Investigations Group in 2000 and consists of diverse volunteers who bring myriad skills and knowledge to their task. The team recently became an official program of the Center for Inquiry (CFI). CFI is also the home of Skeptical Inquirer magazine, the Committee for Skeptical Inquiry, and the medical myth-busting website Quackwatch.

With its two main groups based in Los Angeles and the San Francisco Bay area, CFIIG is the largest paranormal investigation group in the world, with allied groups and field investigators in the United States, Canada, the United Kingdom, Italy, Australia, South Africa, and Germany. It has conducted dozens of investigations and tested numerous paranormal claimants for the CFIIG Challenge. Its newly redesigned website is at cfiig.org.

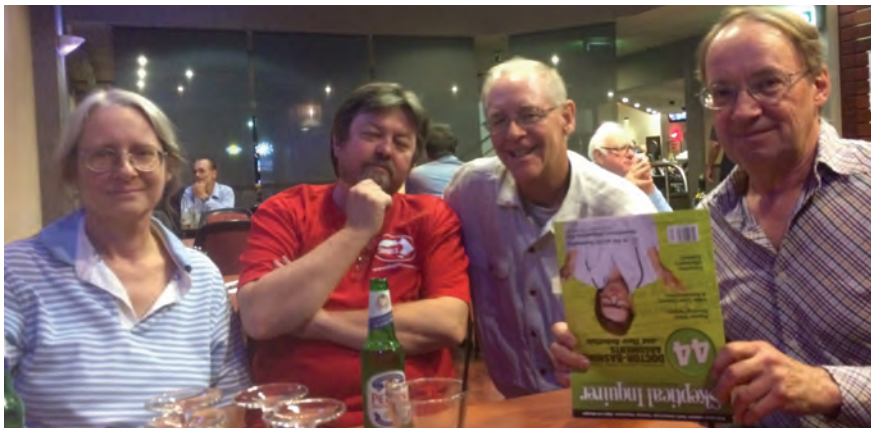
CFIIG recently offered a chance for "Hollywood Medium" Tyler Henry, who claims to communicate with the dead on his E! Television Network show, to demonstrate his powers and claim the prize money. Henry has so far been unresponsive.

In 2018, CFIIG performed an experiment at California's Salton Sea to demonstrate the curvature of the earth to a group of flat-earthers, which was covered by *National Geographic Explorer* (see Underdown's report in SI, November/December 2018). The flat-earthers were, alas, unmoved.

Paul Fidalgo is CFI's communications director.

One of the World's Most Active Groups, Australian Skeptics Observe Fortieth Anniversary

Kendrick Frazier



Tim Mendham (in red shirt), executive officer of the Australian Skeptics and editor of their magazine *The Skeptic*, before the Australian Skeptics National Convention in Sydney in 2014. Having fun with him are, from left, Wendy Grossman, founder and former editor of Britain's *The Skeptic* magazine; Ken Frazier, editor of the Skeptical Inquirer (U.S.); and Ian Bryce, chief investigator for the Australian Skeptics. Photo by Ruth Frazier

The Australian Skeptics and its fine quarterly magazine, *The Skeptic*, are celebrating their fortieth anniversary this year.

"So we can feel a little bit proud of ourselves to have lasted so long and to have increased—we can modestly say—our influence," Tim Mendham, executive officer of the group and editor of *The Skeptic*, wrote in their March 2020 issue, Vol. 40, no. 1.

"We are the second oldest English-speaking skeptic group in the world, so we must have been doing something right."

Our congratulations go out to the Australian Skeptics, including Mendham, current president Jessica Singer, past president Eran Segev, its other officers and supporters, and the many Australian authors who have contributed to both *The Skeptic* and to Skeptical Inquirer over the years.

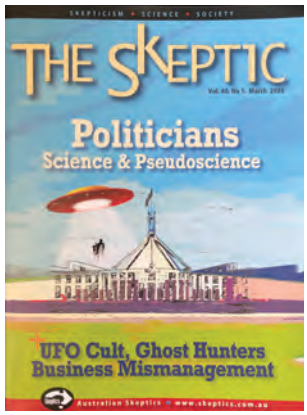
The Australian Skeptics (www.skeptics.com.au) have long been one of the world's most active and effective national skeptics groups.

They also have proudly held thirty-five consecutive annual national conferences—every year since 1985, a record of consistency unsurpassed anywhere—and plan to do so again this year, with the Skepticon 2020 Gold Coast conference October 23–25. Unfortunately, even though Australia has weathered the coronavirus pandemic better than many countries, they've recently decided the 2020 conference will be online only.

The Australian Skeptics were established in 1980—just four years after the U.S. group CSICOP (now our Committee for Skeptical Inquiry, CSI)—after Australian skeptic, publisher, and entrepreneur (and later a CSI fellow) Dick Smith flew paranormal investigator and magician James Randi to Australia to conduct tests of dowsers. The tests resulted in much publicity, and the group formed to continue broad-based and consistent skeptic efforts in Australia.

Mendham noted in his March editorial that those who keep in touch with skeptic groups around the world "will know that the Australian contingent has a bit of a reputation for being more activist than others." He added, "Certainly we've had our share of run-ins with those on the other side of the logic coin—creationists in schools, the anti-vaccination movement, telephone psychics, chiropractors, and countless purveyors of the paranormal and pseudomedical cures. … We have been successful in limiting, at least, the proponents of such junk activities."

Nevertheless, Mendham laments that for every anti-vaxx organization that loses its media credibility, "There's a government instrumentality opening the doors



to nonsense and nonsensical claims for 'traditional' medicines. … Sometimes we are concerned at the lack of even basic scientific literacy among our elected leaders." He was referring to the political situation in Australia (that issue of *The Skeptic* addresses specifics), but the same could be said regrettably of many other countries of the world—and not just regarding nonsense about traditional medicines.

To help commemorate the Australian Skeptics anniversary, we asked Mendham for his further thoughts:

> Like most skeptics groups, we started off small—gatherings of volunteers keen to spread the world. What we lacked in sophisticated marketing we made up for in enthusiasm. In Australia, we made a big push for media attention, and this worked, although in the early days we were plagued with the usual comment from presenters of "But do the Skeptics really believe in themselves?" My response was always, "Congratulations, you are the one-millionth person to make that joke," and normally I'd not get invited back on.
>
> But we did have successes, and gradually turned from a small group regarded as an amusing novelty to a serious player in the pseudoscience and paranormal scene.
>
> We are the second oldest English-language skeptical group in the world, and cheekily we might add that since CSICOP changed its name to CSI, we are actually the oldest. We're modestly proud of the achievement, and we're always grateful for the assistance we got in the early days, and ongoing, from our friends in America. We'll be around to help CSI celebrate its 50th anniversary.

Kendrick Frazier is the editor of the Skeptical Inquirer.

APS Creates Distinguished Award in Lilienfeld's Name

Kendrick Frazier

The Association for Psychological Science (APS) has established a travel award in the name of distinguished psychologist Scott O. Lilienfeld to "honor and extend" his influence on the next generation of clinical psychologists.

Lilienfeld is the Samuel Candler Dobbs Professor of Psychology at Emory University in Atlanta. He is an APS fellow as well as a fellow and member of the Executive Council of the Committee for Skeptical Inquiry. He has been a prolific author of articles on pseudoscience in pop psychology and clinical psychology and on scientific skepticism in general. In fact, he is the lead author of "Intellectual Humility: A Guiding Principle for the Skeptical Movement?" in this issue and coauthor of the cover article "The Nobel Disease" in SI's May/June 2020 issue.

The APS honor noted that he has made a "seminal contribution to understanding of personality and personality disorders, in addition to his work on cognitive biases, memory, and traits that support scientific thinking."

He is editor in chief of *Clinical Psychological Science* and a past president of both the Society for the Science of Clinical Psychology and the Society for the Scientific Study of Psychopathology.

Among the many books he has coauthored or coedited are *50 Great Myths of Popular Psychology*, *Psychological Science under Scrutiny*, *Science and Pseudoscience in Clinical Psychology*, *Navigating the Mindfield: A Guide to Separating Science from Pseudoscience in Mental Health*, and *Brainwashed: The Seductive Appeal of Mindless Neuroscience*. He is also author of textbooks such as *Psychology: From Inquiry to Understanding*.

"[Scott Lilienfeld's] encyclopedic knowledge and contributions across multiple domains have moved our field forward in many directions. … His kindness, generosity, and giving nature have touched the lives of so many grateful collaborators and friends across the globe," said APS Fellow Steven J. Lynn of Binghamton University. "That says a lot about the man who will be a fitting role model for the special student who is the recipient of this high honor."

"Scott is a scholar and a gentleman who has fearlessly confronted 'pseudoscience' in clinical psychology in reasoned, evidence-based debate," added APS Fellow Richard J. McNally of Harvard University. "Never reluctant to address controversial issues, his fair-minded, nondogmatic manner is a model for everyone in our field. These are among the attributes we seek in recipients of the award in Scott's honor."

Kendrick Frazier is the editor of the Skeptical Inquirer.

LEAVE *a* LEGACY *of* REASON

Imagine a future where science and reason serve as the foundation for our lives.

A future where free expression is guaranteed everywhere around the world.

A future where old sectarian divisions have been overcome by the common bond of secular ideals.

This is the future CFI is working toward. Together, we can achieve it. It's never too early to consider a planned gift—*a legacy of reason*.

Call today to reserve your copy of our gift-planning brochure—a helpful guide through the many options available to you.

Then speak to your trusted financial advisor or attorney. It's as simple as that.

IT'S EASY

Call **Connie Skingel** at **1-800-818-7071 x426** for your copy of this valuable information, or email **cskingel@centerforinquiry.org.**

There's no obligation.

Evolution Education: What a Difference a Dozen Years Makes!

A new survey finds clear and convincing gains.

GLENN BRANCH

A lot can happen in twelve years—even in evolution. It took just a dozen years for a population of threespine stickleback fish to evolve to lose the bulk of their armor after colonizing a freshwater lake in Alaska (Bell et al. 2004). Experimental populations of a species of wheat managed in the same amount of time to evolve flowering schedules adapted to different climates in Europe (Rhoné et al. 2010). And over 25,000 generations of *E. coli* evolved and were monitored in exquisite detail in Richard E. Lenski's Long-Term Experimental Evolution Project over the course of its first twelve years (Blount et al. 2008).

It turns out that a lot can happen in twelve years in evolution education too. In a recent report published in the peer-reviewed journal *Evolution: Education and Outreach*, Eric Plutzer, Ann Reid, and I discuss the results of a rigorous national survey of public high school biology teachers commissioned by the National Center for Science Education (Plutzer et al. 2020). The survey, conducted in 2019, was designed to replicate a similar national survey conducted by Plutzer and his colleagues in 2007 (Berkman et al. 2008). There was a lot of change in the twelve years between the two surveys—and a lot of it was for the better.

It turns out that a lot can happen in twelve years in evolution education too.

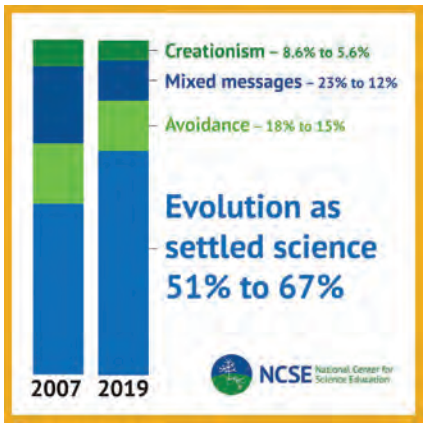
For starters, the teachers reported teaching more evolution. In 2007, the average number of hours devoted to teaching evolution in general was 9.8 hours, with human evolution in particular receiving 4.1 hours. In 2019, the average number of hours devoted to teaching evolution was up to 12.4 hours, a rise of 25 percent, with human evolution in particular receiving 7.7 hours, a rise of 90 percent. Because "nothing makes sense in biology except in the light of evolution," as Theodosius Dobzhansky (1973) famously explained, the increase suggests a degree of progress in high school biology classrooms.

But it wouldn't be true progress unless the increased discussion of evolution was scientifically accurate. What were the teachers saying about evolution? In both surveys, teachers were asked to answer a handful of questions about what themes they highlighted to students in their classes, including whether they emphasize the broad scientific consensus on evolution, whether they emphasize that creationism is a valid scientific alternative to evolution, and (to test a hypothesis about appeals to authority) whether they emphasize that there are reputable scientists who regard creationism as a valid scientific alternative to evolution.

Based on their answers to these three questions, the report offered a fourfold typology of teachers. For the sake of concreteness as well as mnemonic convenience, think of them as Eve, Avery, Mimi, and Craig. Eve emphasizes the broad scientific consensus on evolution while not giving any credence to creationism. Avery avoids endorsing evolution or creationism, while Mimi sends a mixed message by endorsing evolution but also endorsing creationism as a valid scientific alternative to evolution. And Craig, unfortunately, endorses creationism while not endorsing (and perhaps even disputing) evolution.

In 2007, Eves were in the majority, but only barely so, at 51 percent. By 2019, there was a dramatic shift, with more than two-thirds of public high school biology teachers—67 percent, to be exact—reporting as Eves. The proportion of Averys, Mimis, and Craigs correspondingly decreased over those twelve years: from 18 to 15 percent for Averys, from 23 to 12 percent for Mimis, and from 8.6 to 5.6 percent for Craigs. With about four million students enrolled in high school biology classes in the public school system in any given year, the gains for accurate, complete, and honest evolution education are clearly enormous.

It is still a matter of concern that so many of these teachers—more than one in six, 17.6 percent—are presenting creationism as scientifically credible. Unsurprisingly, the personal religious beliefs of teachers play a large role in their choice of what themes to emphasize in the classroom. Presented with the standard options used by Gallup in its polling on evolution and creationism, 4 percent of Eves, 12 percent of Mimis, 25 percent of Averys, and a whopping



60 percent of Craigs in 2019 agreed with the creationist option, "God created human beings pretty much in their present form at one time within the last 10,000 years or so."

Even here there is encouraging news. In the 2007 survey, 16 percent of all the teachers surveyed agreed with the creationist option when presented with the Gallup question, while in the 2019 survey, only 10.5 percent—and only 7 percent of the younger teachers who began teaching after 2007—did, suggesting that creationists are decreasingly likely to be represented among public high school biology teachers. The decrease among high school biology teachers significantly outpaces the decrease in creationism among the general public, which fell from 46 percent in 2007 to 40 percent in 2019, according to Gallup (Brenan 2019).

What accounts for such a striking improvement in the emphasis on evolution in the high school biology classroom? Part of the explanation involves the Next Generation Science Standards.

What accounts for such a striking improvement in the emphasis on evolution in the high school biology classroom? Part of the explanation involves the Next Generation Science Standards (NGSS Lead States 2013), the model set of state science education standards introduced in 2013, endorsed by the National Science Teaching Association (National Science Teaching Association 2016), and adopted in twenty states (plus the District of Columbia) so far. Evolution features prominently in the NGSS, which include "Biological Evolution: Unity and Diversity" as a so-called disciplinary core idea of the life sciences.

Judging from the results of the 2007 survey, the states that would later adopt the NGSS were not noticeably more hospitable to evolution education than states that would not. In fact, such states had the lowest proportion of Eves (49.7 percent) and the highest proportion of Mimis (26.7 percent), although they also boasted the lowest proportion of Craigs (6.3 percent). According to the 2019 survey, however, the states that had by then adopted the NGSS had the highest proportion of Eves (68.9 percent) as well as the lowest proportion of Mimis (11.6 percent) and Craigs (5.1 percent).

A degree of improvement was visible also in the two dozen states that adopted standards based on the same framework on which the NGSS is based (National Research Council 2012) as well as in the six remaining states (Florida, Ohio, North Carolina, Pennsylvania, Texas, and Virginia), so the NGSS is not exclusively to thank. But the evidence suggests that states that adopted standards with increased demands regarding evolution took steps to ensure that teachers acquired the content knowledge of evolution they needed to live up to those demands.

So along with the good news about the improvement in evolution education from 2007 to 2019, a moral emerges: substantial improvements in science education, even for a socially contentious topic such as evolution, are attainable by adopting a scientifically accurate and pedagogically appropriate set of state science standards and arranging to equip teachers with the wherewithal to ensure their students gain the knowledge and abilities specified by those standards. Clear and convincing gains for evolution education were so produced in just twelve years. What good news will a further dozen years of effort bring? ■

References

Bell, Michael A., Windsor E. Aguirre, and Nathaniel J. Buck. 2004. Twelve years of contemporary armor evolution in a threespine stickleback population. *Evolution* 58(4): 814–824.

Berkman, Michael B., Julianna Sandell Pacheco, and Eric Plutzer. 2008. Evolution and creationism in America's classrooms: A national portrait. *PLoS Biology* 6(5).

Blount, Zachary D., Christina Z. Borland, and Richard E. Lenski. 2008. Historical contingency and the evolution of a key innovation in an experimental population of *Escherichia coli*. *Proceedings of the National Academy of Sciences USA* 105(23): 7899–7906.

Brenan, Megan. 2019. 40% of Americans believe in creationism. Gallup (July 26). Available online at https://news.gallup.com/poll/261680/americans-believe-creationism.aspx.

Dobzhansky, Theodosius. 1973. Nothing in biology makes sense except in the light of evolution. *The American Biology Teacher* 35(3): 125–129.

National Research Council. 2012. *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, D.C.: The National Academies Press.

National Science Teaching Association. 2016. NSTA position statement: The Next Generation Science Standards. Available online at http://static.nsta.org/pdfs/PositionStatement_NGSS.pdf.

NGSS Lead States. 2013. *Next Generation Science Standards: For States, By States*. Washington, D.C.: The National Academies Press.

Plutzer, Eric, Glenn Branch, and Ann Reid. 2020. Teaching evolution in U.S. public schools: A continuing challenge. *Evolution: Education and Outreach* 13(14).

Rhoné, Bénédicte, Renaud Vitalis, Isabelle Goldringer, et al. 2010. Evolution of flowering time in experimental wheat populations: A comprehensive approach to detect genetic signatures of natural selection. *Evolution* 64(7): 2110–2125.

Glenn Branch is deputy director of the National Center for Science Education, a nonprofit organization that defends the teaching of evolution and climate science. He recently contributed "Anti-intellectualism and Anti-evolutionism: Lessons from Hofstadter" to the April 2020 issue of *Kappan*.

Joe Nickell, PhD, is CSI's senior research fellow and author or editor of almost fifty books.

The Incredible Saga of Coghlan's Coffin

The astonishing story of Charles Coghlan's coffin has been among the most intriguing claims in the annals of the mysterious, raising the very insistent question: Could a corpse actually develop a "homing instinct"? Could it direct its coffin—freed from its vault by a great natural disaster—across ocean waters many hundreds of miles away back to the land of its heart's desire? Or was the voyage of Coghlan's seemingly determined coffin instead one of the most astonishing coincidences in history?

The Coffin Story

Charles Francis Coghlan (1842–1899) was an actor born to Irish parents living in Paris. Performing on stage in London and New York, he—like many of his contemporary Broadway actors—enjoyed his summers at Bay Fortune in the little Canadian province of Prince Edward Island. In 1899, after performing in Houston, Texas, Coghlan died of gastritis in Galveston on November 27, leaving his wife "prostrated with grief" ("Charles Coghlan" 1899).

However, the most striking element of his four-decade career is the story, launched (to choose an ironic word) after his death. The earliest—and shortest—published version of the returning-coffin account is by Coghlan's fellow actor Sir Johnston Forbes-Robertson. In his book *A Player under Three Reigns* (1925), Forbes-Robertson mentions Coghlan dying at Galveston and adds:

> Shortly after his burial there, a great storm came up from the Gulf which swept his coffin with others into the sea. The Gulf Stream bore him round Florida, up the coast about fifteen hundred miles to Prince Edward Island, and he came ashore not far from his home.

The very brevity of the story and its lack of any precise detail makes it sound more like a folktale than a reliable account. Indeed, no one was able to discover the reburied coffin. Coghlan's daughter asked Forbes-Robertson if he knew the site, but he was unfortunately quite vague even about how he had heard the tale. Coghlan's former manager could himself only say he had heard it "many times."

The tale became a staple of the strange-mysteries genre. After appearing in Forbes-Robertson's book, it was published in a 1928 Robert Ripley "Believe It or Not!" newspaper panel (Ripley 1929). Mystery-mongering writers such as Frank Edwards (1964, 82–83) and Vincent Gaddis (1965, 40–41) further disseminated the tale, which gained additional "facts" and errors in the process.

Investigations

An excellent skeptical look at the proliferating tale was taken by my late friend Melvin Harris in his book *Investigating the Unexplained* (Harris 1986, 191, 194–196). Harris found

that there were no newspaper accounts reporting the coffin's ever having arrived at Prince Edward Island—where it should certainly have proven a sensation. Likewise, there were no records of the alleged reburial, nothing. He concluded that "the whole story is a fantasy."

I looked into the tale for my children's book, *The Magic Detectives* (Nickell 1989, 102–104), challenging young readers to discover errors and unlikely facts in the retelling. In 1999, after addressing forensic experts at the annual conference of the Canadian Identification Society in Fredericton, New Brunswick, I continued through "the Maritimes" of Canada to investigate several mysteries (Nickell 2000). The trip included my second visit to Prince Edward Island, the alleged landing site in question. I learned little more than how many northbound coffins one might launch before chancing to hit Bay Fortune at the mouth of the Fortune River on the island's eastern coast.

I acquired scarce books about the awesome hurricane destruction at Galveston on September 8, 1900, including *The Great Galveston Disaster* (Lester 1900) as well as a little Lutheran tract (Gohdes 1912). Although I became acquainted with the calamity—which necessitated a thousand burials at sea and hundreds of cremations on shore—Coghlan's ultimate fate eluded me.

My old Toronto friend John Robert Colombo, in his *Mysterious Canada* (Colombo 1988, 66–67), suggested that the Coghlan tale may have been derived from another "homecoming" story—not of Charles Coghlan but of a different Charles, Charles Flockton. He was a fellow actor who sometimes also spent summers at Bay Fortune. His wish to have his ashes interred there was carried out after his death in 1904, leading Colombo to conclude, "It was one small step from one Charles to another Charles; and one giant leap from ashes to coffin."[1] Be that as it may, there would be still more to the Coghlan story.

The Coghlan tale may have been derived from another "homecoming" story—not of Charles Coghlan but of a different Charles.

Final Discovery

Over all those years, none of the persons mentioned thus far knew the true fate of Charles Coghlan's coffin.

In fact, however, it had long ago been found—years before the homing-coffin tale itself had even been created. A small, two-paragraph story appeared in the *New York Times* some seven years after the Galveston disaster, telling how the metallic coffin was discovered by hunters, "almost buried" in a marsh and obscured by weeds. The location was only described as "on the mainland in an out-of-the-way place" ("Coghlan's Body Found" 1907).

The short article went on to make clear that at the time of the flood, the coffin had not actually been buried but only stored in a cemetery receiving vault, pending shipment to New York for interment. Beyond this there is no indication of how the casket was identified as Coghlan's—nor, of course, what its ultimate fate would prove to be.

Coghlan's coffin had long ago been found—years before the homing-coffin tale itself had even been created.

Nevertheless, the account does seem to settle the Coghlan mystery. I do not know who was first to relocate the *Times* article, no doubt by a modern internet search, but it is now widely available (see "Charles Francis Coghlan" 2018). I suspect the true final disposition of the actor's body is that indicated in the title of a *New York Times* article dated two days after his death: "Coghlan's Body to be Cremated Here" ("Coghlan's Body to Be Cremated" 1899)—that is, in New York where it was to be shipped. That was delayed, and then a hurricane intervened. However, after the coffin was eventually recovered, it may well be that the cremation was finally carried out according to the original intent. ■

Acknowledgments

I am indebted to my late friend Melvin Harris for his investigative work and to CFI Libraries Director Tim Binga for providing a copy of the *New York Times* Coghlan article of January 15, 1907.

Note

1. A much more Coghlanesque story is that of Mr. Haskell of Prince Edward Island, who reportedly died on a trip to California and was buried there, against his wishes. "A short time later there occurred a terrible earthquake that released the casket and set it free on the water where it floated until it came to Fortune Bay" (Ramsey 1973). However, this appears to be a derivative folktale, a variant of the Coghlan one.

References

Charles Coghlan, the actor and author, dead. 1899. *San Francisco Call* 86 (November 28): 181.

Charles Francis Coghlan. 2018. Available online at https://en.wikipedia.org/wiki/Charles_Francis_Coghlan; accessed July 18, 2018.

Coghlan's body found. Actor's casket was swept away by the Galveston Flood in 1900. 1907. Special to *The New York Times* (January 15): 1.

Coghlan's body to be cremated here. 1899. *New York Times* (November 29).

Colombo, John Robert. 1988. *Mysterious Canada*. Toronto: Doubleday Canada.

Edwards, Frank. 1964. *Strange World*. New York: Lyle Stuart, 82–83.

Forbes-Robertson, Sir Johnston. 1925. *A Player under Three Reigns*. Boston: Little, Brown, and Co., 178.

Gaddis, Vincent. 1965. *Invisible Horizons: True Mysteries of the Sea*. New York: Chilton Books.

Gohdes, C.B. 1912. *John Schenck: A Story of the Galveston Flood*. Columbus, OH: Lutheran Book Concern.

Harris, Melvin. 1986. *Investigating the Unexplained*. Buffalo, NY: Prometheus Books.

Lester, Paul. 1900. *The Great Galveston Disaster*. Philadelphia: International Publishing Co.

Nickell, Joe. 1989. *The Magic Detectives*. Buffalo, NY: Prometheus Books.

———. 2000. Canada's mysterious Maritimes. Skeptical Inquirer 24 (January/February): 15–19.

Ramsey, Sterling. 1973. *Folklore: Prince Edward Island*. Cited by Colombo 1988, 66.

Ripley, Robert L. 1929. *Believe It or Not!* New York: Simon and Schuster.

[REALITY IS THE BEST MEDICINE HARRIET HALL

Harriet Hall, MD, also known as "The SkepDoc," is a retired family physician, a CSI fellow, and an editor of the *Science-Based Medicine* blog. Her website is www.skepdoc.info.

How a Drug Is Born

Big Pharma is not a misnomer; pharmaceutical drugs are big business. The United States is the world leader in producing new drugs and is responsible for nearly half of the new molecular entities (NMEs) that come on the market (Lowe 2010). Americans spend well over $300 billion yearly on prescription drugs (The American Academy of Actuaries' Health Practice Council 2018). Both Big Pharma and the Food and Drug Administration (FDA) have come in for harsh criticism, much of it deserved. A casual observer might jump to the simplistic conclusion that they are both evil. But organizations can't be evil, and the humans in those organizations are not evil; as with anything involving humans, there is a mixture of good and bad. Let's review where drugs come from and how Big Pharma and the FDA develop and approve new drugs.

Ancient History

For most of human history, there were no pharmaceutical companies and thus no pills or drugs as such. There was only folk medicine and herbal medicine, and that's still all that people have in some parts of the world today. People have been self-medicating with medicinal plants for at least 60,000 years—since the Paleolithic period. That has always intrigued me. I wish I had a time machine and could go back to interview those who were the first to try any given plant remedy. The first users must have been either incredibly brave or incredibly foolhardy. Who was the first person to try chewing willow bark for pain? What were they thinking? How did they get the idea in the first place? How did first users decide what part of a plant to ingest and whether to try it raw, cooked, or prepared as an infusion? The entire foxglove plant is toxic; how did they avoid poisoning themselves long enough to discover that the digitalis in it had medicinal value? Would you go out into the forest and eat a random plant to see what happened? By trial and error, our ancestors did somehow manage to discover some effective remedies, but it truly boggles my mind. I can't help wondering what they were thinking

and how many were harmed during the discovery process.

The first users of any given plant remedy must have been either incredibly brave or incredibly foolhardy.

Modern Improvements

Some people still take digitalis leaf and willow bark supplements because they see them as more "natural" than modern drugs. This makes no sense whatsoever. In the first place, *natural* doesn't mean safe and effective. Strychnine is natural but highly poisonous. Willow bark contains salicin, which is effective for pain and fever relief but only after the body converts it to salicylic acid. Chemists developed an improved synthetic drug, acetylsalicylic acid, that was less irritating to the stomach than salicylic acid; it was marketed as aspirin. Aspirin is a pure product; willow bark contains a lot of other ingredients. Aspirin provides a precise, controlled dosage; willow bark may contain varying amounts of active ingredient depending on how and when it is harvested and prepared. It seems foolish to go back to chewing willow bark when you could take an aspirin.

The digitalis story is a great illustration of the advantages of modern drug development. William Withering identified digitalis as the active ingredient in a folk remedy, and he tried out various preparations of various parts of the foxglove plant collected in different seasons. He treated 156 patients and carefully documented his results. Digitalis leaf preparations came on the market but were problematic: the amount of active ingredient varied, and the effective dose was dangerously close to the toxic dose. Chemists isolated and purified the cardiac glycosides that were responsible for foxglove's therapeutic effects. A purified glycoside went on the market as digoxin, under various brand names. Lab tests were developed to measure the serum concentration of digoxin, so today we can test whether the level of drug in the blood is in the therapeutic range. If tests show that the levels are too high, we can promptly and confidently diagnose an overdose and reverse it effectively with an antidote: digoxin immune fab, with antigen-binding fragments derived from antidigoxin antibodies produced by sheep. Because modern digoxin offers all these advantages, there is no reason for anyone to choose digitalis leaf over digoxin.

Around half of pharmaceutical drugs are derived from plants. Someone suggests that a plant might have a medicinal use based on observations, anecdotes, or other factors. Chemists start by identifying, isolating, and purifying the active ingredient. They make chemical modifications that improve its effectiveness and safety. And quite often they develop a synthetic version that is even better than the plant. Artemisinin, an antimalaria drug, was touted as a success of traditional Chinese medicine (TCM). A Chinese researcher, Tu Youyou, won a Nobel Prize for it. But it was actually a triumph of scientific medicine. She got the idea of trying it by picking it out of hundreds of plants mentioned in TCM as useful (mainly for other purposes, not for malaria), but then she did exactly what Big Pharma does: she took a plant remedy, isolated and purified the active ingredient, developed a chemically modified preparation called dihydroartemisin, which worked ten times as well, and eventually found a synthetic version that was even better.

The Drug Development Process

Only one in 5,000 drugs that look promising enough to enter preclinical testing ever make it to market, and the process can take twelve years. There are many steps in the drug development process.

Preclinical testing: Laboratory and animal studies must demonstrate the biological activity of the drug against the targeted disease, and it must be evaluated for safety.

Investigational New Drug (IND) Application: A new drug application must be reviewed and approved by an Institutional Review Board.

Phase I Clinical Trials: The first test on humans is typically done on twenty to eighty healthy volunteers to study the pharmacokinetics, including safe dosage range, absorption, metabolism, excretion, duration of action, etc.

Phase II Clinical Trials: These controlled studies of effectiveness are done on 100 to 300 patients who have the disease the drug is intended to treat.

Phase III Clinical Trials: These large randomized controlled trials involve 1,000 to 3,000 patients in hospitals and clinics and last an average of three years. They compare the drug's effectiveness to a control group and collect reports of side effects.

New Drug Application (NDA): The manufacturer analyzes the data from all the studies and presents it to the FDA for review of the evidence for the drug's effectiveness and safety. An NDA has at least 100,000 pages, and review of the application typically takes two-and-a-half years.

Phase IV Studies: Also known as post-marketing studies, these are organized collections of data on drugs after they have been approved by the FDA and have gone on the market. It is not unusual for new side effects to emerge as the drug is used by larger numbers of patients who are a more diverse group than those selected for the studies.

Warnings and Withdrawals

By one estimate, about a third of new drugs approved between 2001 and 2010 were involved in some kind of safety event (Christensen 2017). Sometimes the manufacturers were required to include "black box" warnings to notify users of newly discovered risks. Only three drugs were withdrawn from the market. In many cases, a manufacturer voluntarily recalls a product after complaints are received or lawsuits are filed. In rare cases, when the manufacturer

fails to take appropriate action, the FDA can issue a mandatory recall.

Can the Process Be Shortened?

The FDA created a "fast track" and an "accelerated approval" path in an attempt to shorten the approval process, but some of the drugs that got quicker approval were found to have a larger number of adverse events. The FDA has to walk a fine line. If it postpones approval, patients who need the drug can't get it; if it approves prematurely, there could be disasters, such as the European thalidomide epidemic of babies born with the birth defect phocomelia. By refusing FDA approval for thalidomide, Frances Kelsey saved thousands of American babies from being born with missing limbs.

Exorbitant Drug Prices

Some drug prices have become exorbitant, so much so that diabetics have died because they couldn't afford their insulin and tried to ration it. The price of the lifesaving EpiPen inexplicably soared from $94 for a set of two auto-injectors to over $700. Skyrocketing prices have forced some patients to choose between life-saving medications and food. I subscribe to *The Medical Letter*, which reviews new drugs, and am constantly appalled by the drug prices, which are frequently over $100,000 and can sometimes exceed a million dollars. The April 6, 2020, issue of *The Medical Letter* covered two new drugs recently approved by the FDA for the treatment of sickle cell disease. Each offered only modest benefits, and each cost over $120,000 for a year's treatment. The standard treatment, hydroxyurea, is known to be more effective and costs less than $900 a year.

Pharmaceutical companies that used unethical marketing tactics to promote the sales of opioids are now being sued for their role in creating the opioid epidemic. Companies often game the patent system by making small modifications to their products to maintain monopolies. They have tried to prevent the development of patent-free generics and have repeatedly put profits over patient welfare.

Drugs Save Lives and Offer Benefits

New drugs have changed HIV/AIDS from a death sentence to a preventable and controllable chronic disease that doesn't appreciably shorten life expectancy. We now have drugs that cure hepatitis C. We have vaccines to prevent cancers caused by two viruses: hepatitis B and human papillomavirus.

The FDA and Big Pharma are far from perfect, but they have accomplished a great deal of good.

There is now a vaccine for Ebola.

My husband and I have really appreciated two of Big Pharma's new drug developments. Having had two episodes of pulmonary embolus, I will have to take anticoagulants for the rest of my life. Until recently, it was a choice between daily injections into the abdomen or Coumadin pills, which require frequent blood tests and dosage adjustments to keep the blood level in a narrow range. They also require dietary restrictions and interact with many other medications. Instead, now I just take an apixaban (Eliquis) pill twice a day. No pain, no needles, no inconvenience, no blood tests, no dietary restrictions. My husband's type 2 diabetes went out of control, and we thought he would have to go on insulin—along with all the complications that entails. Instead, his blood sugar was easily normalized with Trulicity, a once-a-week prefilled syringe with a convenient auto-injector.

The FDA and Big Pharma are far from perfect, but they have accomplished a great deal of good. The process of new drug development and approval is responsible for major advances in medical treatment. Contrast the methods and successes of this real medicine with the claims of alternative medicine, and there's no contest. ■

References

The American Academy of Actuaries' Health Practice Council. 2018. Prescription Drug Spending in the U.S. Health Care System. Available online at https://www.actuary.org/content/prescription-drug-spending-us-health-care-system.

Christensen, Jen. 2017. Nearly a third of FDA-approved drugs had problems, study finds. CNN Health (May 9). Available online at https://www.cnn.com/2017/05/09/health/fda-approval-drug-events-study/index.html.

Lowe, Derek. 2010. Where drugs come from: By country. *Science Translational Medicine* blog (November 9). Available online at https://blogs.sciencemag.org/pipeline/archives/2010/11/09/where_drugs_come_from_by_country.

[BEHAVIOR & BELIEF STUART VYSE

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

Are You Afraid of the Thirteenth Floor?

Superstition and Real Estate, Part 2

Elevator buttons from the Flamingo Hotel & Casino, site of CSICon 2019. (Author photo)

In my May/June 2020 column, I described the influence of feng shui on the Chinese real estate market. Although it would be hard to match the pervasive presence of traditional Chinese superstition in real estate and other areas of commerce, the Chinese are not alone. One of the most interesting survey results I've ever come across is a 2007 Gallup poll that showed that 13 percent of American adults would be bothered if given a hotel room on the thirteenth floor (Carroll 2007). Not only that, but 9 percent of respondents said they would be bothered enough to ask for a different room. As is the case for many traditional superstitions, the majority of those who said they would be bothered were women.

These findings have important business implications. No hotel owner wants to have a problem at check-in with 13 percent of their customers, so it makes business sense to skip the number thirteen on the elevator panel and avoid the problem.

That is exactly what many developers have done. According to a 2015 story in the *Atlantic* (published on Friday, July 13), the real estate website CityRealty.com conducted a study of 629 condominium buildings in Manhattan that had thirteen or more stories and discovered that 91 percent omitted the thirteenth floor, labeling it fourteen or other variants, such as 12B or 14A (Li 2015). Similarly, the sixty-story Millennium Tower, built on the site of the former flagship Filene's department store in downtown Boston, opened in 2017 with neither a thirteenth floor nor a forty-fourth floor (Clauss 2016). As mentioned in part 1 of this series, four is considered an unlucky number in Asian culture, and the Millennium Tower developers have eliminated the inauspicious forty-fourth floor in deference to potential Asian buyers.

All this bowing to superstition continues despite some anecdotal evidence that the thirteenth floor is not scary for most buyers. Alexandra Bellak, a broker with Douglas Elliman Real Estate, said in the *Atlantic* that he'd never had

Millennium Tower in Boston, Massachusetts, which has neither thirteenth nor forty-fourth floors. (Wikimedia)

a buyer reject a thirteenth-floor apartment (Li 2015). Similarly, Jonathan Miller, a New York City–based appraiser and president of Miller Samuel Inc., said in the *Wall Street Journal*, "I've done lots of floor-level studies, and I haven't seen anything that suggests it sways consumer behavior or impacts value or marketability" (Tanaka 2013). But developers are apparently very cautious. Eliminating the thirteenth floor protects property values and has the added benefit of suggesting the building is a little taller than it actually is. However, a few developers are bucking the trend.

All of this bowing to superstition continues despite some anecdotal evidence that the thirteenth floor is not scary for most buyers.

For example, in recent years Toll Brothers has built several residential buildings in New York City with identified thirteenth floors. David Von Spreckelsen, division president of Toll Brothers City Living in New York, said, "I think it is a silly thing to be afraid of" (Tanaka 2013). Furthermore, there is a real estate investment firm in Miami called 13th Floor Investments (https://13fi.com/). Their real estate developer affiliate is called 13th Floor Homes (https://www.13thfloorhomes.com/).

Bargain Hunting on the Thirteenth Floor in Moscow

By geographical size, Russia is the largest country in the world, dominating Asia from Eastern Europe to the Pacific Ocean, yet despite its physical proximity to China, Russia's numerical superstitions are more European than Asian. Unlike in the United States, Russian developers do not avoid making buildings with identified thirteenth floors. Instead, some offer a discounted price for apartments on the thirteenth floor. A recent study published in the journal *Judgment and Decision Making* tried to determine whether the discounts—typically 10 percent—offered to Muscovite homebuyers for apartments on the thirteenth floor were sufficient to compensate for any superstitious reluctance to buy. The researcher, Dmitry Burakov (2018), took actual real estate data from the city of Moscow, which happens to be experiencing a period of rapid development. He separated out those developers who offered a thirteenth-floor discount and those who did not, and he also looked at the number of units sold on the seventh floor—presumably a lucky location. To control for other factors that might have affected the popularity of the units, Burakov selected buildings where the layouts of the units were the same on the floors above and below, making it possible to compare sales of the sixth and eighth floor units to the seventh floor, as well as sales of the twelfth and fourteenth floor units to the thirteenth floor. Finally, Burakov identified thirty buildings where no thirteenth-floor discount was offered and ten where a 10 percent discount was offered.

The International Business District of Moscow. (Wikimedia)

Russian developers do not avoid making buildings with identified thirteenth floors. Instead, some offer a discounted price for apartments on the thirteenth floor.

Burakov's results were clear. He found no significant effect on apartments on the lucky seventh floor, but he found a very strong thirteenth floor effect. In buildings where no discount was offered, substantially fewer units were sold on the thirteenth floor (see Figure 1). However, in the buildings where a 10 percent discount was offered for apartments on the thirteenth floor,

Figure 1. Share of units sold in Moscow apartments on various floors. Based on data from Burakov (2018).

the superstitious effect was completely eliminated. Fear is a great motivator, and evidently fear of the thirteenth floor is alive and well in Moscow. It is somewhat surprising that the Russians have not taken the lead of real estate developers in the United States and other countries by skipping the thirteenth floor, but perhaps, like American developer David Von Spreckelsen, they think it is silly to change the numbers on the elevator panel.

Vastu Shastra: The Indian Feng Shui

In the previous installment in this series, I discussed some of the principles of feng shui, the ancient Chinese system of design that claims to maximize the flow of positive *chi* (a presumed life force) to promote health and prosperity. Although it is less well-known in the United States, there is a similar architectural system in India: vastu shastra, derived from the vedas, the ancient Sanskrit texts that are the source of Hinduism. In the United States, vedic architecture has been most actively promoted by followers of the Maharishi Mahesh Yogi (1918–2008), the developer of transcendental meditation who gained popularity when the Beatles visited him in India.[1] The Maharishi promoted his own version of vedic architecture, Maharishi vastu, that he said creates "cosmic harmony and support to the individual for his peace, prosperity, and good health" (Fortune Creating Buildings N.d.).

Many of the buildings on the campus of Maharishi University of Management in Fairfield, Iowa, are built in accordance with Maharishi vastu. Although feng shui suggests that the entrance of a building should face south, vedic principles require that the building face east so that the rising sun's most nourishing energy falls on the house (Fortune Creating Buildings N.d.). Maharishi vastu also requires that a home have a quiet area in the center of the house, known as a Brahmasthan, or a "place where wholeness resides" (Fortune Creating Buildings N.d.). Many vastu homeowners place a small table decorated with flowers or a vase in the middle of the building, and a skylight is sometimes placed over the Brahmasthan. In addition, Maharishi vastu buildings display a conical object on the roof, known as a kalash. The kalash is said to "[enliven] the connection of the house with the cosmos" (Fortune Creating Buildings N.d.).

As you may have guessed, just as in the case of feng shui, there is no scientific basis for the claims of vedic architecture. In preparation for this article, I did a literature search using the terms *vedic architecture* and *Maharishi vastu*. *Vedic architecture* produced several hits for studies of "vedic multipliers" for use in computers. Some of these articles are published in what appear to be disreputable predatory journals, such as the *International Journal of Scientific and Research Publications*. In this context,

The Argiro Student Center and dining hall at Maharishi International University in Fairfield, Iowa. The building was built in accordance with Maharishi vastu design principles. Two kalashes can be seen on the roof of the building. (Wikimedia)

vedic architecture refers to the hardware architecture of the computer.

Searching for *Maharishi vastu* revealed a 2019 article titled "Architecture and Creativity: Examining the Impact of Maharishi Vastu on Workplace Creativity" (Maheshwari and Werd 2019), published in *Creativity Research Journal* (a legitimate journal produced by the Taylor & Francis Group). Unfortunately, this ranks as one of the worst articles I have read in many years. In my opinion, it should never have been published. The article is essentially a replication of a famous Western Electric study that produced what is known as the "Hawthorne effect" (McCambridge et al. 2014), one of the most famous of confounding variables in psychological research. Anil K. Maheshwari and Margaret Rose P. Werd conducted a pre-post case study without a control group. They located a company that was moving from their previous offices into a new building designed using the Maharishi vastu architectural principles. The participants in the study were the employees of an unnamed "engineering and architectural firm" (Maheshwari and Werd 2019, 373) who were given a standard test of creativity in the old building and a different version of the same test four months later in the new building. The results showed a significant increase in originality at the second testing in the new building.

As you may have guessed, just as in the case of feng shui, there is no scientific basis for the claims of vedic architecture.

It is hard to know where to begin in enumerating the flaws in this study. First, there is no control group, so we have no idea what effect a similar move to a non-Maharishi vastu design building would have produced. The stated reason for the move was that the company "needed more space to accommodate future growth" (Maheshwari and Werd 2019, 373), so there was presumably more room in the new building. Furthermore, little effort was made to avoid the Hawthorne effect, which is produced when participants know they are in a study. Back in the 1950s, a series of industrial psychology studies were conducted at the Hawthorne Works, a large Western Electric factory in Cicero, Illinois. According to legend, in some of the studies, workers—who knew they were being observed—appeared to improve performance no matter what the researchers did: increased lighting led to faster work; decreased lighting led to faster work. The specifics of the Western Electric study have been debated, but what are now more often called the "demand characteristics" of a study involve participants knowing they are being studied and reacting to that knowledge in some way—most often by trying to help out the experimenter (Orne 2009). In the case of the Mahashwari and Werd (2019) study, participants were told they were part of a "relocation study," but, of course they were given a creativity test first at the old building and then a similar test at the new one. It would not be very difficult for the employees of an architectural firm to figure out what the desired outcome for this repeated testing might be.

It is hard to know where to begin in enumerating the flaws in this study. First, there is no control group.

In addition to these experimental design flaws, the authors state they have no conflict of interest, but they are based at the Maharishi University of Management in Fairfield, Iowa, the primary center of transcendental meditation and the study of the Maharishi Mahesh Yogi's philosophy in the United States. They may not have benefitted financially from the study, but it would have been better to have Maharishi

In addition to these experimental design flaws, the authors state they have no conflict of interest, but they are based at the Maharishi University of Management in Fairfield, Iowa.

Interior of a small Maharishi vastu design house. The rose-colored square on the floor marks the Bramasthan, or quiet center of the house. (YouTube)

vastu architectural principles tested by an independent research group rather than by a university so closely connected with the Maharishi. It is also standard practice to include a section near the end of a research article that discusses the limitations of the study to place the results in context; however, this section was not included by Mahashwari and Werd. (Much of the previous paragraph could have appeared in a limitations section.) Finally, if there were not enough reasons to be skeptical of this research, the authors identify Maharishi vastu architectural principles as the presumed cause of the observed changes in creativity. These included alignment in an eastern or northern direction because it "is said to bring about auspicious influences of good health and wealth" and rooms designed to "strengthen the connection of individual intelligence with cosmic intelligence" (Mahashwari and Werd 2019, 372). The authors offer no explanations for how the orientation of building promotes good health and wealth and provide no definition of the term *cosmic intelligence*.

Final Thoughts

I am going to step out on a limb here and say that, despite the study by Mahashwari and Werd, there is no more scientific support for the claims of vedic architecture than there is for its Chinese cousin, feng shui. So far, the influence of vedic architecture on the U.S. real estate industry seems to be quite modest in comparison to that of the far more prominent feng shui. The website of Fortune Creating Buildings, a firm that specializes in Maharishi vastu architecture, features pictures of beautiful, peaceful-looking homes. At this point, transcendental meditation is a minor movement in American society, and these homes are likely to appeal to a small group of upper-middle-class people who are swayed by the unsubstantiated claims of vedic architecture. Feng shui will continue to be a much more powerful force in the real estate market because it is so deeply imbedded in Chinese culture.

Here in the West, I see little hope of overcoming the thirteenth-floor problem. The Moscow study shows that the number thirteen has a substantial effect on apartment prices there, and the American strategy of eliminating the number thirteen from building labeling is likely to sustain the effect of the superstition rather than diminish it. If there is an overall message to be taken from this two-part series on superstition in real estate, it is that, when superstition is present in the consumer marketplace, it can either increase profits (lucky colors and numbers) or decrease profits (the number four or thirteen), but it always maintains belief in irrational notions of good and bad luck. ■

Feng shui will continue to be a much more powerful force in the real estate market because it is so deeply imbedded in Chinese culture.

Note

1. According to *Rolling Stone* (Chiu 2019): "The band's planned three-month stay at the ashram was cut short, however, following sexual misconduct allegations against the Maharishi. 'We made a mistake there,' Lennon later said, as quoted in *The Beatles Anthology*. 'We believe in meditation, but not the Maharishi and his scene. … We thought he was something other than he was.'"

References

Burakov, Dmitry. 2018. Do discounts mitigate numerological superstitions? Evidence from the Russian real estate market. *Judgment and Decision Making* 13(5): 467–470.

Carroll, Joseph. 2007. Thirteen percent of Americans bothered to stay on hotels' 13th floor. Gallup.com (March 5). Available online at https://news.gallup.com/poll/26887/thirteen-percent-americans-bothered-stay-hotels-13th-floor.aspx.

Chiu, David. 2019. The Beatles in India: 16 things you didn't know. *Rolling Stone* (September 22). Available online at https://www.rollingstone.com/music/music-news/the-beatles-in-india-16-things-you-didnt-know-203601/.

Clauss, Kyle Scott. 2016. The Millennium Tower has no 44th floor. *Boston Magazine* (February 8). Available online at https://www.bostonmagazine.com/news/2016/02/08/millennium-tower-boston-44-floor/.

Fortune Creating Buildings. N.d. Principles of Maharishi vastu architecture. Maharishivastu.org. Available online at https://www.maharishivastu.org/principles-of-maharishi-vastu-architecture.

Li, Shirley. 2015. Skipping the 13th floor. *The Atlantic* (July 13). Available online at https://www.theatlantic.com/technology/archive/2015/02/skipping-the-13th-floor/385448/.

Maheshwari, Anil K., and Margaret Rose P. Werd. 2019. Architecture and creativity: Examining the impact of Maharishi vastu on workplace creativity. *Creativity Research Journal* 31(4): 371–376. Available online at https://doi.org/10.1080/10400419.2019.1667943.

McCambridge, Jim, John Witton, and Diana R. Elbourne. 2014. Systematic review of the Hawthorne Effect: New concepts are needed to study research participation effects. *Journal of Clinical Epidemiology* 67 (3): 267–77. Available online at https://doi.org/10.1016/j.jclinepi.2013.08.015.

Orne, Martin T. 2009. Demand characteristics and the concept of quasi-controls. In Robert Rosenthal and Ralph L. Rosnow (Eds.), *Artifacts in Behavioral Research: Robert Rosenthal and Ralph L. Rosnow's Classic Books* New York: Oxford University Press, 110-137.

Tanaka, Sanette. 2013. A 13th-floor condo? No such luck. *The Wall Street Journal* (September 5). Available online at https://www.wsj.com/articles/a-13thfloor-condo-no-such-luck-1378417974.

[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or co-author of a dozen books, including *Investigating Ghosts: The Scientific Search for Spirits*.

Being Skeptical of Initial Skepticism

Q: **Have you ever been skeptical about a finding or assertion, then did your own investigation only to have your conclusions further corroborate the initial assertion? If so, can you provide any examples?**

—Mike D.

A: There are—or should be—many times in a person's life when their initial skepticism about some claim or other was proven wrong, and skeptics are no exception. Being skeptical is merely asking for good evidence for an assertion, not knee-jerk doubting nor dismissal.

Deciding whether to be skeptical of a claim involves initially gauging its plausibility, which is in turn informed by research, expertise, and personal experience. A folklorist would find an urban legend about a hook-handed killer less plausible than would the average teenager around a midnight campfire. The subjects I've been wrong about tend to be, not surprisingly, those outside my area of expertise.

The plausibility of a claim is also determined by a person's beliefs and worldview; an atheist will find miracle claims far less plausible than would a devout Catholic, for example. And

An atheist will find miracle claims far less plausible than would a devout Catholic.

of course, it depends on the nature of the assertion; for example, the claim that New Mexico is the fourth largest state by area is plausible (but incorrect), while the claim that psychics predicted the 2020 COVID-19 pandemic is inherently implausible (and also incorrect).

My initial skepticism has been incorrect many times. An example can be found in this very column; I got a query asking, "Sylvia Browne stated that most people die within three months of their birthdays; is this true?" I was skeptical at first, but after a bit of analysis I found that she was right and replied:

> Browne is correct that most people die within three months of their birthday. While Browne probably dispensed this factoid as a bit of quasi-mystical wisdom gleaned from her informants on "the other side," the issue really comes down to science and statistics. Part of the answer depends on how strictly and specifically you wish to interpret the question. Counting three months (or ninety days) to the minute of a person's birth will of course give a relatively narrow window, though most people (including Browne) probably begin counting from the target person's *month* of birth. This allows for three months before the birth, the month of the birth, and three months after the birth, for seven out of twelve months. Since this range covers well over half the year (just under 60 percent of it), the chances are somewhat better than 50/50 that a given person will die within three months of their birth, just as Browne stated.

I've also been wrongly skeptical of mundane topics. For example, I find it inconceivable that patients fall asleep in a dentist chair while having one or more people drilling, scraping, flossing, and undertaking quasi-industrial endeavors in a person's open mouth. I find dental work uncomfortable and occasionally painful, and I can't imagine being so relaxed and comfortable that I would nod off into peaceful slumber during such an ordeal without being literally put to sleep by the dentist with anesthetic.

However, I recognize that my experiences may not reflect those of others and that anecdotes are not data. I didn't doubt that it had ever happened, of course. I just assumed it was very rare. I didn't commit, publicly or privately, to a position on the matter; it was more a curiosity, but it's fair to say that I was skeptical. To quantify the phenomenon, I did a bit of informal investigation. I searched the internet for any information on the matter. I asked my dentist and dental assistants the next time I went in for a cleaning how often they experienced it firsthand. I also posted a query to my (nonrepresentative) sampling of 2,145 friends on Facebook. I was surprised to discover that it was far more common than I had expected (though according to my dentist, it's most common among night-shift workers).

I recognize that my experiences may not reflect those of others and that anecdotes are not data.

There are other examples as well, ranging from initially implausible (non)presidential tweets to surprising news stories. The claims I typically investigate are by their nature extraordinary. A mundane claim may be true or not, but I'm not likely to investigate it (or profess some measure of skepticism about it) unless there's some reason to do so. Often I'm less skeptical of *whether* something happened than I am of a specific assumption or interpretation of *why* or *how* it happened. I'm not skeptical that a door may have swung open on its own or that someone may have heard an odd sound in an empty home, but I may be skeptical it was caused by a ghost.

Questioning other people's assertions and assumptions comes naturally, but questioning our own is much more difficult. Nevertheless, as the aphorism notes, "When an honest man discovers he is mistaken, he will either cease to be mistaken or cease to be honest." ■

Six Degrees Author Mark Lynas on Our Warming World

AMARDEO SARMA

Mark Lynas is a British environmentalist who has written books on climate, nuclear energy, GMOs, and how science has changed his mind. Climate change has been featured in many of his books; his latest, *Our Final Warning: Six Degrees of Climate Emergency*, is a new and updated edition. It outlines what lies ahead with every added degree of warming. He was a climate change advisor to President Mohamed Nasheed of the Maldives between 2009 and 2011 and is a coauthor of *An Ecomodernist Manifesto*.

Lynas is a visiting fellow with the Cornell Alliance for Science at Cornell University and a fellow of the German skeptics organization GWUP. He received the Breakthrough Paradigm Award of the Breakthrough Institute in 2012. He has written for numerous publications and outlets, including the *New York Times*, *Washington Post*, *Wall Street Journal*, the *Guardian*, and CNN.

What was your motivation for writing a new edition of your book *Six Degrees*? What was different writing the second edition?

I received many queries asking whether my views have changed since I wrote the book and whether I have become more optimistic or pessimistic. I wanted to answer the same questions. I followed a process similar to that of the IPCC [Intergovernmental Panel on Climate Change] to gain an understanding of what has changed in the climate change arena.

The process for the second edition was easier because everything is online now. For the first edition, I had to be at the library of the University at Oxford to read papers. Also, I gained a lot of knowledge going through the process once before. I am not a bonafide expert, but I am sufficiently well versed in the science now to sift through the material more quickly.

"There is a lot of eco-pessimism out there. That reflects more the psychological state and the political preferences of the actors as much as anything."

Some critics state that too many climate scientists use RCP 8.5 for their climate projections and say RCP 6.5 or even RCP 4.5 are closer to business-as-usual. [RCPs are representative concentration pathways, greenhouse gas concentration trajectories adopted by the IPCC.] Are you too pessimistic in using RCP 8.5? You seem very optimistic at the same time. What gives you hope?

I don't care which RCP is business-as-usual. I am interested in the temperatures. I look at what the temperature outcomes are and what the impacts associated with them are. RCP 8.5 studies are useful because they give us a good picture of moderate to high-end impacts.

But I don't believe there is no escape. There is a lot of eco-pessimism out there. That reflects more the psychological state and the political preferences of the actors as much as anything. I am not of that persuasion—and it is not supported by the data.

We are not on the RCP 8.5 pathway if you look at our current trajectory. You'd have to do a lot of coal burning for that to happen. We are eliminating coal, and we have done this in the United Kingdom. The question is whether we get to the 1.5 or 2-degree [Celsius] targets.

In your book, you do not rule out a runaway greenhouse effect as a point of no return—ever. In your view, is that—something that happened on Venus—a real possibility?

I was interested in looking at what is the absolute worst case scenario. You often hear that the planet will survive and there will always be life and that even if humans die, the planet would bounce back. I got to thinking that that's not right. My hunch was that if we emit enough carbon, we could feed a runaway greenhouse effect given what we know of the ancient history of Venus.

Computer models show how far you have to drive the heating process with carbon to get to what they call a "moist greenhouse." Then you get to a continually increasing water vapor concentration in the atmosphere. That breaks down the way the atmosphere circulates to destroy the troposphere and stratosphere. Usually, the water vapor at some stage condenses back to liquid. When you stop that from happening, the water vapor increases the greenhouse effect, and the oceans boil off. Eventually, the hydrogen is dissociated and lost into space, which is probably what happened with Venus.

"You just have to bear in mind that we could make life on the planet extinct if we make some catastrophic decisions."

A runaway greenhouse effect is something that takes geological time, but it is not a desirable pathway to go down. You just have to bear in mind that we could make life on the planet extinct if we make some catastrophic decisions.

Do you see a borderline of x degrees that we have to avoid?

That is the point. There is no borderline, where on the one side you have the apocalypse and on the other side a livable planet. It is not binary like that. It is worse if it is 3.5 than if it is 3, and 2.5 is worse than 2.

I think that the 1.5/2 degree Paris targets are reasonably well supported by what we know about likely climate impacts. It will be nice to keep some semblance of the world of today. You've also got to worry about tipping points. I don't want to overstate this, because it is not like you pass the tipping point next Thursday and then everything is lost. These things take decades to play out. In the Arctic, you have to melt the permafrost, and these have to release methane with its feedback into global

warming. But we are pushing the planet into ever more dangerous territory over time.

How critical are you of geoengineering?
I am not in favor of stratospheric aerosol engineering, but it may be needed if we are desperate. There are always different things you can do that are technically manageable. My dislike of geoengineering reflects spiritual or qualitative preferences. I don't think we can find a scientific argument to ban all such research. All knowledge within certain boundaries is good. The more we know about these things, the more options we have.

What is your view of the German approach with renewables only, compared to countries such as Finland, the Czech Republic, Slovakia, or the UnitedKingdom, who also favor nuclear energy? And what about carbon capture and storage (CCS)?
I have my personal views reflected in my book. Even when I was going through a pro-nuclear campaigning phase, I always avoided being overly skeptical about renewables because I thought there was huge potential there. Plus I wanted us to work together.

When I wrote this book, I thought I could write a line on nuclear. But I made a calculated decision not to get into the tribal technology wars. I did not want to make the book pro-nuke/anti-nuke or pro-renewable/anti-renewable. Reading it should be of equal interest to anyone who is interested and thinks that climate change is a risk.

The situation about renewables, nuclear, and carbon capture and storage changes all the time. I try not to close doors by saying that this or the other is not going to work. What is more of a challenge now is to keep pushing forward with technology innovation and to rapidly amplify the transition to clean technologies. And I mean all clean technologies.

"I always avoided being overly skeptical about renewables because I thought there was huge potential there."

One of the things I did ten years ago was to work with the renewables, nuclear, and CCS people to lobby for stronger carbon targets, which was partly successful. I still think that the low-carbon people should be working together. Diversity is our friend. I don't mind if countries want to do their own particular thing. You've got to get coal off the system. There are problems with

"I still think that the low-carbon people should be working together. Diversity is our friend."

large hydro, and there are problems with all sources of energy. There is no such thing as a free lunch. You have got to look at the pros and cons of each.

Do countries in the Global South have to go down the same path as the older industrial nations?
In most of these countries, solar is probably the cheapest option. If you are in capitals in Africa, you get used to blackouts. It comes down to infrastructure and development. But that development can largely be clean. You don't have to start with huge amounts of coal to give power to people who have very little access to energy.

What do you think of the repeated discussion about mitigation versus adaptation?
This is a false dichotomy because adaptation is part of the mitigation effort as well. Some of the problems are with us today, and we have to do all that we can to save lives immediately, as well as avoid a much worse catastrophe in the future. I don't have any problem with that. In Bangladesh and West Bengal in India, they have just had a super cyclone. There were a few dozen deaths, which of course is a tragedy. Still, it was nothing compared to what used to happen in the seventies and earlier decades before they had proper scientific forecasting, cyclone shelters, and those kinds of things that come with development. Hundreds of thousands of people would have died in these cyclones had we not had that level of adaptation, if you like.

Many activists blame climate deniers for the current state of affairs. Are we overestimating their influence?
I don't think that denialism is such a significant factor anymore. It is an old white men thing. Take the the Global Warming Policy Foundation (GWPF). The GWPF has all publications by emeritus professors who are fading qui-

etly into the night and want to have one last shout and get some attention and therefore do the contrarian thing. I don't think that is politically significant.

Ecomodernists and traditional environmental groups are divided on what to do. Is cooperation between them possible?
Divides are not a bad thing per se. I believe in democracy and pluralism. Diversity is not a thing I want to eradicate. I don't want to get people to think the same thing. I am a cosignatory and coauthor to the ecomodernist manifesto. It was not a statement like a religious gospel. It was intentionally a provocation to get people in the environmental movement to think in ways they did not before. The environmental movement is too small. It has to be everybody. You can't solve the climate crisis unless you have willing participation from people on the right. You are not going to have a Bernie Sanders–type of regime in perpetuity, and I wouldn't even want there to be.

You have to have enough of a cross-party consensus on the fact that we need to save the climate. That means that divisive Greens-only plans, even if they get out there and are met with much enthusiasm, won't work. Politically, I am a bit more of a centrist. I am on the left, but I would not count myself on the far left. So maybe that's a reflection of where I am.

Where do you see ecomodernism today?
Ecomodernism was something where I was trying to forge pro-science environmentalism. I have been very pro-genetic engineering and nuclear and things like that. I just think these debates need to be evidence-based. What infuriates me more than anything else is not the climate deniers but people who are smart, young, and informed who come out with pseudoscientific attitudes on GMOs. I find that more infuriating, because I want them to be better as environmentalists. If you pollute environmentalism with antiscience mysticism, then you have negated a potential force for good in the world. For me, that would be the most tragic thing of all. If I have a life's work, it is to do my bit to make sure that environmentalism is informed by science. ■

Amardeo Sarma is an engineer, General Manager at NEC Laboratories Europe GmbH in Heidelberg, Germany, chairman of the German skeptics organization GWUP, and fellow and Executive Council member of the Committee for Skeptical Inquiry.

"You have to have enough of a cross-party consensus on the fact that we need to save the climate."

FEATURED IN THIS ARTICLE

Our Final Warning: Six Degrees of Climate Emergency. By Mark Lynas. Fourth Estate, 2020, ISBN-13: 978-0008308551, 384 pp. Hardcover, $28.

We are living in a climate emergency. But how much worse could it get? Will civilization collapse? Are we already past the point of no return? What kind of future can our children expect? Rigorously cataloging the very latest climate science, Mark Lynas explores the course we have set for Earth over the next century and beyond. Degree by terrifying degree, he charts the likely consequences of global heating and the ensuing climate catastrophe. (Source: Amazon Books)

INTELLECTUAL HUMILITY: A GUIDING PRINCIPLE FOR THE SKEPTICAL MOVEMENT?

Intellectual humility is a virtue that can and should be a unifying principle for skeptics.

SCOTT O. LILIENFELD, ADELE N. STROTHER, SHAUNA M. BOWES, AND THOMAS H. COSTELLO

"I beseech you, in the bowels of Christ, think it possible you may be mistaken."

—Oliver Cromwell, to the General Assembly of the Church of Scotland, 1650

In November 2019, attendees of the Committee for Skeptical Inquiry's CSICon conference received the following inquiry from an anonymous CSI member in their email inboxes:

> I've been thinking a lot about what it means to be a skeptic and what skepticism means to such people. I had a thought that I'd like your feedback on … *(1) What does being a skeptic mean to you? (2) What do you think are the most important elements of skepticism?*

The answers to these questions are far from self-evident. Although skepticism has been the subject of numerous conceptual treatments—some from a primarily scientific perspective (Beyerstein 1996; Novella et al. 2018) and others from a primarily philosophical perspective (DeRose and Warfield 1999; Bupp and Kurtz 2012; Pritchard 2019)—the skeptical movement has long struggled to identify a guiding credo. For example, Skeptical Inquirer magazine observes that "Skepticism is … not a cynical rejection of new ideas, as the popular stereotype goes, but rather an attitude of both open mind and critical sense" (skepticalinquirer.org/what-is-skepticism/). From this vantage point, skepticism requires us to adopt an epistemic stance—an approach to knowledge—marked by two seemingly contradictory viewpoints: an open-mindedness to novel claims conjoined with an insistence on subjecting them to rigorous and impartial scrutiny (see also Sagan 1996). Still, this characterization raises an intriguing question echoed by the two queries posed at the outset of this article: Is there a deeper psychological "essence" or "attitude of mind" underlying skepticism? If so, what is it?

An Inherent Tension within the Skeptical Movement

Anyone who has followed the skeptical movement over the past few decades is keenly aware of deep-seated disputes within its ranks regarding how best to deal with proponents of unsubstantiated

assertions, such as those regarding the paranormal or complementary and alternative medicine. Should skeptics adopt a "take-no-prisoners" approach, which ruthlessly takes such advocates to task, or a "kinder and gentler" approach, which challenges them firmly but tactfully? Or is a mix of both approaches needed, depending on the situation at hand? At skeptics' conferences, in skeptical publications, and on skeptics' blogs, one commonly sees both strategies, spanning the gamut from ridicule to respect, but with scant consensus on which is most useful for changing hearts and minds.

Prominent figures within the ranks of the skeptical movement have long raised alarms regarding its at-times arrogant or elitist tone (Plait 2010). One of skepticism's leading voices, astronomer and science writer Carl Sagan, expressed these worries decades ago: "The chief deficiency I see in the skeptical movement is its polarization: Us vs. Them—the sense that we have a monopoly on the truth; that those other people who believe in all these stupid doctrines are morons; that if you're sensible, you'll listen to us; and if not, to hell with you. This is nonconstructive. It does not get our message across" (Sagan 1996).

We share Sagan's concerns. At the same time, the question of how much openness or respect to display to proponents of scientifically unsupported claims is far from settled. Few would dispute Sagan's contention that routinely maligning believers in the paranormal is unlikely to be productive. Yet there may be cases (especially when advocates of dubious claims brazenly exploit vulnerable individuals) in which a hardline approach to debunking claims is warranted or even necessary. We suspect that without a coherent unifying approach to addressing scientifically unjustified assertions and their advocates, the skeptical movement is likely to grapple with these debates for the foreseeable future.

In this article, we propose that *intellectual humility* is an overarching approach to evidence that the skeptical movement may wish to embrace as a guiding credo. As psychologist William O'Donohue and his colleagues have noted, intellectual humility is a key *epistemic virtue*: a character disposition that helps us to minimize error in our web of beliefs (Quine and Ullian 1978) and ideally arrive at a closer approximation to the truth (O'Donohue et al. 2017).

Intellectual Humility: Conceptual and Definitional Issues

For centuries, if not millennia, scholars have warned of the hazards of intellectual hubris (Cowan et al. 2019). The sixteenth-century French philosopher Michel de Montaigne (1595) wrote that "the plague of man is boasting of his knowledge." Perhaps owing to its origins in philosophy (Lynch 2019) and the definitional fuzziness that sometimes accompanies philosophical discussions, the concept of intellectual humility has not readily lent itself to scientific investigation. Nevertheless, in the past few years, intellectual humility has increasingly become a focus of empirically oriented psychologists, owing largely to the construction of several promising measures of this construct (McElroy-Heltzel et al. 2019). Although psychologists have yet to converge on a consensual definition of intellectual humility, most concur that it encompasses an awareness of one's intellectual limitations and biases (Church and Samuelson 2016; Leary et al. 2017; Lilienfeld and Bowes 2020); an appreciation of alternative perspectives; and an acknowledgement that the evidentiary bases of one's beliefs are often incomplete (Alfano et al. 2017; Whitcomb et al. 2017).

Intellectual humility is a fundamentally "metacognitive" (thinking about thinking) construct (Zohar and Barzilai 2013), meaning that intellectually humble individuals habitually reflect on their thinking processes, applying the principles of skepticism to their own reasoning. To give readers a flavor of the concept, Table 1 presents representative items from several questionnaire measures of intellectual humility.

Table 1. Items from Selected Intellectual Humility Measures

I reconsider my opinions when presented with new evidence (Leary et al. 2017).
I am willing to hear others out, even if I disagree with them (Krumrei-Mancuso and Rouse 2016).
When I realize that someone knows more than me, I feel frustrated and humiliated (reversed in scoring) (Alfano et al. 2017).
I feel comfortable admitting my intellectual limitations (Haggard et al. 2018).
I try to reflect on my weaknesses to develop my intelligence (Porter and Schumann 2018).
I often get defensive if others do not agree with me (reversed in scoring) (McElroy et al. 2014).

Intellectual humility is ostensibly tied to what psychologists term a small *bias blind spot*. Research suggests that when asked about various ubiquitous cognitive biases, such as confirmation bias (Nickerson 1998) and hindsight bias (Fischhoff 1975), most of us report that *other* people are prone to these biases while *we* are largely or entirely immune to them (Pronin et al. 2002); this discrepancy is termed *bias blind spot.* Hence, most of us are not merely psychologically blind to some degree but *blind to our blindness*. In principle, intellectually humble people are more cognizant of their biases than other people, although whether they are less bias-prone in general is unknown.

Some authors also regard intellectual humility as encompassing respect for others' views (Hook et al. 2017; Krumrei-Mancuso and Rouse 2016), although other scholars see this capacity as a downstream effect of intellectual humility rather than a necessary feature. These definitional disagree-

ments notwithstanding, data suggest that individuals with high levels of self-reported intellectual humility are more likely than those with low levels to regard sharp disagreements as reflecting respectful differences of opinion that are worthy of discussion (Porter and Schumann 2018).

Intellectual humility is moderately correlated with, but independent of, overall humility (Davis et al. 2016). Preliminary evidence also suggests that intellectual humility is modestly associated with general intelligence (Zmigrod et al. 2019). In addition, intellectual humility bears robust associations with certain personality traits, especially those tied to agreeableness, conscientiousness, and openness to new experiences and ideas (Davis et al. 2016; McElroy et al. 2014).

Contrary to what some authors (e.g., Pritchard 2019) have implied, intellectual humility does not imply low self-confidence. Data suggest that intellectual humility is unrelated to, and perhaps even slightly positively correlated with, self-esteem, as well as confidence in one's beliefs (Meagher et al. 2015; Porter and Schumann 2018). Hence, one can simultaneously be intellectually humble and largely certain of one's convictions, especially if one has subjected them to searching scrutiny. One likely exemplar of this principle was Carl Sagan. Having once met with Sagan for an hour and a half, the first author of this article found him intensely intellectually challenging, at times even ferocious; Sagan asked penetrating questions and displayed no signs of diffidence. At the same time, Sagan was open to positions that contradicted his own and was more than willing to change his mind when confronted with contrary evidence. Like Sagan, prototypically intellectually humble individuals are not ideological pushovers. Instead, they weigh their convictions proportionally to the strength of the evidence.

Intellectual Humility and Skepticism

Why should readers of Skeptical Inquirer and similar publications be aware of intellectual humility's implications? There are at least three reasons.

First, at least in principle, intellectual humility may occupy the middle ground between excessive gullibility on the one hand and cynicism on the other (see also Zagzebski 1996). Many authors have identified the golden mean or "sweet spot" between these two extremes as synonymous with skepticism (Beyerstein 1996; Molé 2002; Pigliucci 2003). In the words of Michael Shermer (2002), skepticism reflects "the essential balance between orthodoxy and heresy, between a total commitment to the status quo and the blind pursuit of new ideas."

Second, the key component of skepticism—extending doubt to claims—does not come naturally to the human mind. Intellectual humility is broadly consistent with this ethos but extends it to doubting one's own beliefs, not merely those of others. In this regard, Paul Kurtz, one of the giants of skepticism, echoed the views of philosopher and mathematician Charles Sanders Peirce: "There is always the possibility that we may be in error. Our observations may need to be corrected. We may have misinterpreted the data. We may be mistaken" (Kurtz and Shook 2010, 26).

Third, data from our laboratory suggest that intellectual humility is linked to several psychological dispositions that are presumably relevant to skepticism, such as low levels of confirmation bias and dogmatism, as well as to "objectivism," the tendency to base one's beliefs on rigorous data and carefully considered reasons rather than on intuitions or subjective experiences (Bowes 2019). In addition, intellectual humility appears to be somewhat protective against susceptibility to an intriguing construct termed "pseudoprofound BS" (Pennycook et al. 2015), which reflects a tendency to perceive superficially deep but vacuous assertions, such as "We are in the midst of a high-frequency blossoming of interconnectedness that will give us access to the quantum soup itself," as meaningful (Bowes 2019). Intellectual humility is also associated with lower levels of endorsement of conspiracy theories and lower levels of belief in the discredited causal link between vaccines and autism (Bowes, Costello, et al. 2020). Potentially consistent with these findings, acceptance of conspiracy theories is positively associated with narcissism (Cichocka et al. 2016), which is a marker of low intellectual humility (Alfano

Data from our laboratory suggest that intellectual humility is linked to several psychological dispositions that are presumably relevant to skepticism, such as low levels of confirmation bias and dogmatism.

et al. 2017). Moreover, intellectual humility predicts higher levels of belief in global warming as well as greater openness to scientific arguments challenging one's views regarding global warming (Bowes, Blanchard, et al. 2020).

Still, much of this evidence is provisional and arguably flawed. Most of the data we have reviewed derives from self-reported measures of intellectual humility. It may be paradoxical to ask individuals about their own levels of humility (Lilienfeld and Bowes 2020). To the extent that the essence of humility is an awareness of one's weaknesses, many intellectually humble participants may substantially underestimate their levels of this trait. Conversely, we can all think of highly immodest individuals—perhaps a few prominent politicians come to mind—who greatly overestimate their levels of intellectual humility. This "paradox of humility" may pose a formidable challenge to measuring intellectual humility and allied traits (Christen et al. 2014). In future research, it will be essential to circumvent this limitation by supplementing self-reports of intellectual humility with informant reports and behavioral observations, including objective indicators of how often individuals have changed their minds when confronted with persuasive contrary evidence (Rodriguez et al. 2019).

Intellectual Humility and Scientific Thinking

In many respects, we can think of science as an organized prescription for intellectual humility (Lilienfeld et al. 2017; McFall 1996). In our chosen field of psychology, for example, the procedural controls demanded of researchers—such as control groups, blinding of observations, and elimination of potential confounding variables—constitute efforts to combat confirmation bias and other cognitive errors that can be fueled by intellectual hubris. They are methodological bulwarks against fooling ourselves and fooling others; they are also among the features that best distinguish science from pseudoscience (Bunge 1984). As Carl Sagan and Ann Druyan observed, "Science … is forever whispering in our ears, 'Remember, you're very new at this. You might be mistaken. You've been wrong before'" (Sagan 1996, 34–35).

Similarly, in the words of social psychologists Carol Tavris and Elliott Aronson (2007), science is a method of "arrogance control" (109), because it implicitly acknowledges that scientists frequently make mistakes, whether in their theorizing, methods, analyses, or interpretations. Many of the institutionalized safeguards of science, including formalized peer review and what Helen Longino (1990) termed *transformative interrogation* (ongoing scrutiny of fellow scientists' assertions at conferences, during informal conversations, on blogs, and so on) are essential defenses against human error. Hence, even though individual scientists are not necessarily intellectually humble, the scientific community relentlessly pushes back on their overstatements, operating as a means of collective error detection and error correction (Oreskes 2019).

At the risk of overgeneralization, it seems safe to conclude that scientists are more often rewarded for trumpeting their positive findings than for admitting mistakes or acknowledging shortcomings in their results (Diamandis and Bouras 2018). Yet as neuroscientist Stuart Firestein (2015) reminded us in a trenchant analysis, failure is an essential driver of scientific progress, as disconfirmation of our cherished hypotheses tends to be the most efficient means of weeding out errors in our belief systems (O'Donohue 2013; Popper 1959). As scientists, science communicators, and science educators, we should enthusiastically seek out, welcome, and publicize our failed predictions. We should come to regard erroneous hypotheses as our friends.

Still, as scientists, we sorely need more role models of intellectual humility. One of our favorite examples derives from Charles Darwin's autobiography. In reflecting on his approach to recording data, Darwin wrote:

> I had, also, during many years followed a golden rule, namely, that whenever a published fact, a new observation or thought came across me, which was opposed to my general results, to make a memorandum of it without fail and at once; for I had found by experience that such facts and thoughts were far more apt to escape from the memory than favourable ones. (Darwin 1898, 123)

This lovely quotation captures much of the essence of intellectual humility, including its contemporary conceptualization as a small bias blind spot (Lilienfeld and Bowes 2020). Darwin conceded his propensity toward confirmation bias and explained how he undertook concerted efforts to compensate for it. He may have been just as prone to biases as were other life scientists, but he was better prepared to counteract them.

A more recent example comes from Princeton University psychologist Daniel Kahneman, recipient of the 2002 Nobel Prize in Economic Sciences. In his book, *Thinking, Fast and Slow*, Kahneman (2011) touted the robustness of several highly counterintuitive psychological findings based on social priming paradigms. In one famous experiment, researchers reported that students primed to think of old age by unscrambling words related to the elderly (such as *Florida* and *wrinkle*) were later more likely to walk down the hall slowly than were non-primed students (Bargh et al. 1996). When it comes to these and other surprising findings, Kahneman wrote, "Disbelief is not an option. The results are not made up, nor are they statistical flukes. You have no choice but to accept that the major conclusions of these studies are true" (Kahneman 2011, 56). Yet as unsuccessful efforts to replicate social priming findings mounted, so did Kahneman's doubts and those of other psychologists. Even though Kahneman and his collaborator Amos Tversky had conducted classic work

on the law of small numbers, which demonstrated that most people draw unjustifiably strong inferences from data originating from small samples (Tversky and Kahneman 1971), Kahneman himself had apparently disregarded this cardinal principle when appraising the merits of social priming studies, many of which were conducted on modest numbers of participants.

When a colleague pointed out this inconsistency to Kahneman in a blog posting, how did he respond? Kahneman wrote:

> What the blog gets absolutely right is that I placed too much faith in underpowered studies. As pointed out in the blog, and earlier by Andrew Gelman, there is a special irony in my mistake because the first paper that Amos Tversky and I published was about the belief in the "law of small numbers," which allows researchers to trust the results of underpowered studies with unreasonably small samples. … Our article was written in 1969 and published in 1971, but I failed to internalize its message. (Kahneman 2017)

If only all scientists and politicians were this willing to own up to their errors!

A final refreshing example of intellectual humility from our own field is the website The Loss-of-Confidence Project, founded in 2018, which encourages psychologists to share examples of their published results that they no longer believe (see lossofconfidence.com/). As of this writing, this project has attracted statements from about a dozen researchers who say that they have lost confidence in one or more of their findings. Several of them confessed that, in retrospect, they had "massaged" the data in several ways before obtaining evidence for their hypotheses (Rohrer et al. 2018). We hope that other psychological researchers, as well as those in other scientific disciplines, will soon follow suit in owning up to doubts regarding their own findings.

Concluding Thoughts

Research on intellectual humility is in its relative infancy, and many conceptual and empirical questions remain to be resolved. Still, we are reasonably confident that intellectual humility holds promise as a lodestar for the skeptical movement. In our view, all skeptics should seek to become more aware of their cognitive limitations, including their biases, and acknowledge that the evidentiary bases of their beliefs are often fallible. In addition, although skeptics should not shy away from adopting forceful positions regarding blatantly unsubstantiated clams, they should be reluctant to dismiss strong assertions prior to careful inquiry. As Carl Sagan (1996) warned us, skeptics should be wary of assuming that they possess a monopoly on the truth.

If our analysis has merit, all skeptics should strive to inculcate a thoroughgoing sense of intellectual humility in themselves and others and avoid the tempting allure of intellectual arrogance. But of course, we might be wrong. ■

References

Alfano, M., K. Iurino, P. Stey, et al. 2017. Development and validation of a multi-dimensional measure of intellectual humility. *PloS one* 12(8).

Bargh, J., M. Chen, and L. Burrows. 1996. Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology* 71(2): 230–244.

Beyerstein, B. 1996. *Distinguishing Science from Pseudoscience*. The Centre for Curriculum and Professional Development. Victoria, Canada: Simon Fraser University.

Bowes S.M. 2019. *Expanding the Nomological Network of Intellectual Humility: An Examination of Personality Traits, Cognitive Styles, Critical-Thinking, and Self-Perception*. Master's Thesis, Emory University, Atlanta, Georgia.

Bowes, S.M., M. Blanchard, T.H. Costello, et al. 2020. *Stepping Outside the Echo Chamber: Is Intellectual Humility Associated with Reduced Political Bias*? Poster presented at the Annual Meeting of the Society for Personality and Social Psychology, New Orleans, LA.

Bowes, S.M., T.H. Costello, W. Ma, et al. 2020. *Conspiratorial Thinking and Personality Traits: Disconfirming the Null Hypothesis*. Paper presented at the University of Miami Conspiracy Theory Conference in Miami, FL.

Bunge, M. 1984. What is pseudoscience? Skeptical Inquirer 9(1): 36–47.

Bupp, N., and P. Kurtz. 2012. *Meaning and Value in a Secular Age: Why Eupraxsophy Matters—The Writings of Paul Kurtz*. Amherst, NY: Prometheus Books.

Christen, M., M. Alfano, and B. Robinson. 2014. The semantic neighborhood of intellectual humility. *Proceedings of the European Conference on Social Intelligence* 1283: 40–49.

Church, I., and P. Samuelson. 2016. *Intellectual Humility: An Introduction to the Philosophy and Science*. London: Bloomsbury Academic.

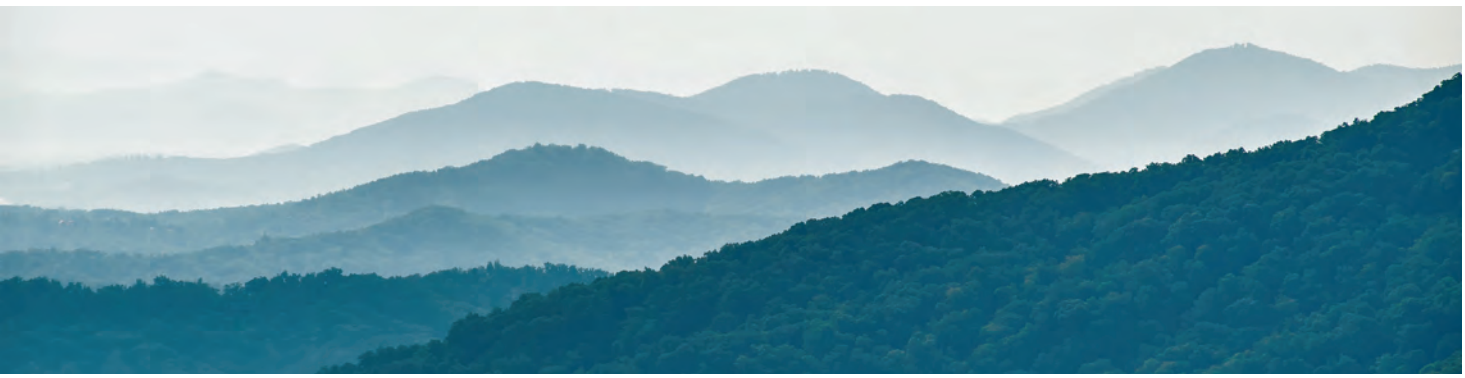
Cichocka, A., M. Marchlewska, and A. de Zavala. 2016. Does self-love or self-hate predict conspiracy beliefs? Narcissism, self-esteem, and the endorsement of conspiracy theories. *Social Psychological and Personality Science* 7(2): 157–166.

Cowan, N., E. Adams, S. Bhangal, et al. 2019. Foundations of arrogance: A broad survey and framework for research. *Review of General Psychology* 23(4): 425–443.

Cromwell, O. 1650. Letter 129 – 3rd August 1650 to the General Assembly of the Kirk of Scotland (letter). *The Cromwell Association* (August 3). Available online at http://www.olivercromwell.org/Letters_and_speeches/letters/Letter_129.pdf.

Darwin, C. 1898. *The Life and Letters of Charles Darwin. Including an Autobiographical Chapter. Volumes I and II*. New York: D. Appleton & Company.

Davis, D., K. Rice, S. McElroy, et al. 2016. Distinguishing intellectual humility and general humility. *The Journal of Positive Psychology* 11(3):



215–224.
de Montaigne, Michel. 1595. *Michel de Montaigne—The Complete Essays*. London: Penguin Classics.
DeRose, K., and T. Warfield. 1999. *Skepticism: A Contemporary Reader*. Oxford, U.K.: Oxford University Press.
Diamandis, E., and N. Bouras. 2018. Hubris and sciences. *F1000Research* 7(133).
Firestein, S. 2015. *Failure: Why Science Is So Successful.* Oxford, U.K.: Oxford University Press.
Fischhoff, B. 1975. Hindsight is not equal to foresight: The effect of outcome knowledge on judgment under uncertainty. *Journal of Experimental Psychology: Human Perception and Performance* 1(3): 288–299.
Haggard, M., W. Rowatt, J. Leman, et al. 2018. Finding middle ground between intellectual arrogance and intellectual servility: Development and assessment of the limitations-owning intellectual humility scale. *Personality and Individual Differences* 124: 184–193.
Hook, J., J. Farrell, K. Johnson, et al. 2017. Intellectual humility and religious tolerance. *The Journal of Positive Psychology* 12(1): 29–35.
Kahneman, D. 2011. *Thinking, Fast and Slow*. New York: Farrar, Straus and Giroux.
———. 2017. Reconstruction of a train wreck: How priming research went off the rails (blog entry response). *Replicability-Index* (February 14). Available online at https://replicationindex.com/2017/02/02/reconstruction-of-a-train-wreck-how-priming-research-went-of-the-rails/comment-page-1/.
Krumrei-Mancuso, E., and S. Rouse. 2016. The development and validation of the comprehensive intellectual humility scale. *Journal of Personality Assessment* 98(2): 209–221.
Kurtz, P., and J. Shook. 2010. *Exuberant Skepticism*. Amherst, NY: Prometheus Books.
Leary, M., K. Diebels, E. Davisson, et al. 2017. Cognitive and interpersonal features of intellectual humility. *Personality and Social Psychology Bulletin* 43(6): 793–813.
Lilienfeld, S.O., and S.M. Bowes. 2020. Intellectual humility: Ten unresolved questions. In P. Graf (ed.), *The State of the Art In Applied Psychology*. New York: Wiley.
Lilienfeld, S.O., S.J. Lynn, W. O'Donohue, et al. 2017. Epistemic humility: An overarching educational philosophy for clinical psychology programs. *Clinical Psychologist* 70(2): 6–14.
Longino, H.E. 1990. *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry*. Princeton, N.J.: Princeton University Press.
Lynch, M.P. 2019. *Know-It-All Society: Truth and Arrogance in Political Culture*. New York: Liveright Publishing.
McElroy, S., K. Rice, and D. Davis. 2014. Intellectual humility: Scale development and theoretical elaborations in the context of religious leadership. *Journal of Psychology and Theology* 42(1): 19–30.
McElroy-Heltzel, S., D. Davis, C. DeBlaere, et al. 2019. Embarrassment of riches in the measurement of humility: A critical review of 22 measures. *The Journal of Positive Psychology* 14(3): 393–404.
McFall, R.M. 1996. Making psychology incorruptible. *Applied and Preventive Psychology* 5(1): 9–15.
Meagher, B., J. Leman, J. Bias, et al. 2015. Contrasting self-report and consensus ratings of intellectual humility and arrogance. *Journal of Research in Personality* 58: 35–45.
Molé, P. 2002. Are skeptics cynical? Popular misunderstandings of skeptics. Skeptical Inquirer 26(6): 44–48.
Nickerson, R. 1998. Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology* 2(2): 175–220.
Novella, S. et al. 2018. *The Skeptics' Guide to the Universe: How to Know What's Really Real in a World Increasingly Full of Fake*. New York: Grand Central Publishing.
O'Donohue, W. 2013. *Clinical Psychology and the Philosophy of Science*. Berlin/Heidelberg: Springer Science + Business Media.
O'Donohue, W., J. Casas, D. Szoke, et al. 2017. Scientific progress in clinical psychology and epistemically virtuous research. *Behavior and Philosophy* 45: 45–63.
Oreskes, N. 2019. *Why Trust Science?* Princeton, N.J.: Princeton University Press.
Pennycook, G., J. Cheyne, N. Barr, et al. 2015. On the reception and detection of pseudo-profound bullshit. *Judgment and Decision Making* 10(6): 549–563.
Pigliucci, M. 2003. The sin of scientism. Skeptical Inquirer 27(6): 21–22.
Plait, P. 2010. *Don't Be a Dick* (speech). The James Randi Educational Foundation. Available online at https://vimeo.com/13704095.
Popper, K. 1959. *The Logic of Scientific Discovery*. Abingdon-on-Thames: Routledge.
Porter, T., and K. Schumann. 2018. Intellectual humility and openness to the opposing view. *Self and Identity* 17(2): 139–162.
Pritchard, D. 2019. *Scepticism: A Very Short Introduction*. Oxford, U.K.: Oxford University Press.
Pronin, E., D. Yin, and L. Ross. 2002. The bias blind spot: Perceptions of bias in self versus others. *Personality and Social Psychology Bulletin* 28(3): 369–381.
Quine, W., and J.S. Ullian. 1978. *The Web of Belief*. New York: McGraw-Hill Education.
Rodriguez, D., J.N. Hook, J.E. Farrell, et al. 2019. Religious intellectual humility, attitude change, and closeness following religious disagreement. *The Journal of Positive Psychology* 14(2): 133–140.
Rohrer, J., W. Tierney, and E. Uhlmann, et al. 2018. Putting the self in self-correction. Available online at https://psyarxiv.com/exmb2/.
Sagan, C. 1996. *The Demon-Haunted World: Science as a Candle in the Dark*. London, U.K.: Headline Book Publishing.
Shermer, M. 2002. Skepticism as a virtue. *Scientific American* 286(4) (April): 37.
Tavris, C., and E. Aronson. 2007. *Mistakes Were Made (but Not by Me): Why We Justify Foolish Beliefs, Bad Decisions, and Hurtful Acts*. San Diego, CA.: Harcourt.
Tversky, A. and D. Kahneman. 1971. Belief in the law of small numbers. *Psychological Bulletin* 76(2): 105–110.
Whitcomb, D., H. Battaly, J. Baehr, et al. 2017. Intellectual humility: Owning our limitations. *Philosophy and Phenomenological Research* 94(3): 509–539.
Zagzebski, L. 1996. *Virtues of the Mind: An Inquiry into the Nature of Virtue and the Ethical Foundations of Knowledge*. Cambridge, U.K.: Cambridge University Press.
Zmigrod, L., S. Zmigrod, P.J., Rentfrow, et al. 2019. The psychological roots of intellectual humility: The role of intelligence and cognitive flexibility. *Personality and Individual Differences* 141: 200–208.
Zohar, A., and S. Barzilai. 2013. A review of research on metacognition in science education: Current and future directions. *Studies in Science Education* 49(2): 121–169.

Scott O. Lilienfeld, PhD, is Samuel Candler Dobbs Professor of Psychology at Emory University (Atlanta), a visiting scholar at the University of Melbourne, and a member of the CSI Executive Council. He is recent past president of the Society for a Science of Clinical Psychology.

Adele N. Strother, BS, is the lab manager for the Lilienfeld Laboratory at Emory University. Her research interests include intellectual humility, cognitive bias, unusual beliefs, pseudoscience, morality, interpersonal communication, and evidence-based practice.

Shauna M. Bowes, MS, is an advanced graduate student in the clinical psychology doctoral program at Emory University. Her areas of professional interest include abnormal and normal personality traits, cognitive styles, intellectual humility, rationality, and cognitive bias management strategies.

Thomas H. Costello, MS, is an advanced graduate student in psychology at Emory University. His interests include the implications of personality for political attitudes and behaviors, differences and similarities in authoritarianism across the political Right and Left, and psychopathic personality.

SKEPTICISM AND PSEUDOEXPERIMENTS

Pseudoscience is often discussed in skeptical circles. But a related issue, pseudoexperiments, is common, less recognized, and possibly as pernicious.

BENJAMIN RADFORD

Pseudoscience is something that presents as, or is mistaken for, science—but is not. Pseudosciences are especially resilient and pernicious because they benefit from the hard-earned legitimacy of real science as arbiter of objective truth. From phrenology to astrology, homeopathy to facilitated communication, pseudosciences gain believers conditioned to (rightfully) respect science and its methods.

Pseudoexperiments are similar in that they typically present an experiment—a crucial tool in science—and apply it in a popular culture context (though without the input of actual scientists, who might needlessly complicate the attempt with seemingly frivolous trivialities such as control groups, blinding, research design, or, really, anything that might make it valid).

Pseudoexperiments are common in everyday life, though rarely identified as such. More often they're seen as rhetorical devices, entertainment, or simply news. They have a populist plausibility because they have a superficially valid lesson: To understand some phenomenon, you don't need to look at research design or boring statistics. You can "see for yourself" what's going on, what the truth is. They are especially effective because they give the illusion of objectivity. Pseudoexperiments, like scientific experiments, are usually portrayed as unbiased—though often activist—"real world" examples to prove a point. Like classic pseudoscientists, pseudoexperimenters want the *prestige* of science but don't want to put in the effort to make it meaningful or valid. Their goal is not the discovery of nuanced truth about the world but instead promoting an agenda by means of a simplified, memorable "gotcha" moment.

A pseudoexperiment is not necessarily the same as a *flawed* experiment. Conducting a perfect scientific experiment is very difficult (if not impossible), which is why p-values are factored into a study's results. Flawed research is a hallmark of many pseudosciences and paranormal topics, from ghosts to crop circles to cryptozoology. For pseudosciences such as psi, there is an inverse correlation between the quality of the research and the amount of good evidence obtained; the better the controls, the less empirical evidence appears (as Jim Alcock, Stuart Vyse, Scott Lilienfeld, and others have noted in this magazine). There are several types of pseudoexperiments.

Pseudoexperiments as Television Fodder

Most pseudoexperiments are done for a viewing audience, often for journalistic, entertainment, or commercial purposes. In January 2006, security specialist Bill Stanton appeared on *The Today Show* posing an alarming and provocative question: If you saw an innocent child being kidnapped by a stranger, would you help?

There are several approaches that the producers could take

to answer the question, including interviewing a social psychologist about research on bystander effects. But the producers chose a more dramatic angle: using hidden cameras to record a seven-year-old named Rachelle faking being abducted on a city street. Rachelle's mother watched from a surveillance van as Stanton approached the girl, who stood alone in the middle of a sidewalk playing a video game. Stanton walked up to Rachelle and took her by the arm, saying things such as, "There you are, young lady! You come with me," while Rachelle protested, "No, no … you're not my daddy!"

Stanton and Rachelle repeated the scenario several times, and rarely did bystanders intervene. Some kept walking, and others glanced briefly at the scene, but few approached. The *Today Show* anchors called the results "shocking," and to everyone involved (and probably the audience), this seemed a clear and sad case of people reluctant to help someone in need. "It's frightening that no one will help," Rachelle's mother said.

Yet there may be a good reason more people didn't get involved—one completely missed (or ignored) by Stanton and the *Today Show* producers: the bystanders didn't believe that they were actually seeing a child abduction. Because the "abduction" was poorly staged, it's more likely that those who witnessed the scene simply—and accurately—recognized that the child was not in real danger. From the footage, it's clear that Rachelle was not an actress and didn't act scared when Stanton approached her. Her protests sounded like a typical child's whines instead of panicked pleas for help. Stanton did not strike the child or hurt her in any way, and Rachelle didn't scream, kick at, or fight off the man supposedly trying to abduct her. In short, there was little that would convince the average person that she was genuinely in danger. The problem isn't the seven-year-old's acting; it's a poorly conducted pseudoexperiment by Stanton and NBC News. *The Today Show*'s hidden camera test would be valid only if the bystanders actually believed that the child was in danger; it's not clear that was the case.

The highly rated ABC News series *What Would You Do*?, hosted by John Quiñones, follows an identical format and is now in its fourteenth season. Hidden cameras record people in public places such as restaurants and involve social justice issues, including race, gender identity, disability, and parenting. Will strangers step in to confront a staged racist or sexist remark made between two actors? Will passersby act against an able-bodied person using a handicapped spot? Quiñones, who was inspired to go into journalism by Geraldo Rivera—himself no stranger to alarmist television, especially during the "Satanic Panic" scare of the 1980s—said that he believes his show "holds up a mirror" to America.

While some of these staged performances are inevitably better executed than others, it's not clear how valid or generalizable the results are. People may choose (or choose not to) publicly intervene in events nearby for any number of reasons unrelated to the hypothesis offered by the show (apathy, prejudice, etc.). Bystanders may not fully understand what's going on; they may have visual or auditory disabilities and sincerely not have noticed the seemingly alarming event; they may be socially anxious or fearful about confronting others; and so on—though often the broadcast reactions are precisely what the producers hoped they'd be. Like *Candid Camera* and countless other shows, these pseudoexperiments are voyeuristic entertainment, not science experiments or philosophical musings on responsibility such as seen in *Rashomon* (1950) or *Force Majeure* (2014).

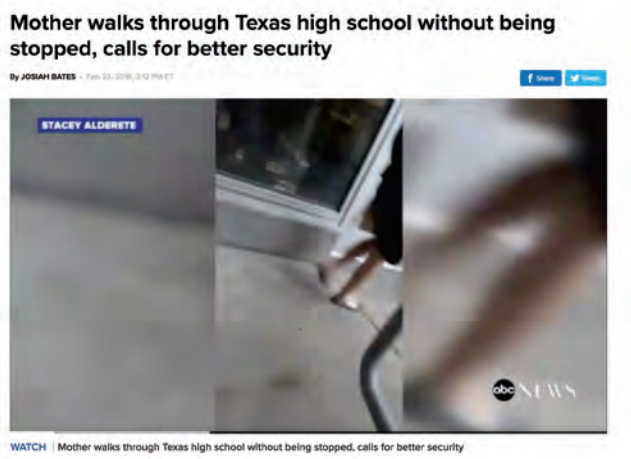
In some cases, it's a physical pseudoexperiment. In 1992, *Dateline NBC* aired a program titled "Waiting to Explode," which examined claims that General Motors trucks exploded when involved in low-speed collisions due to faulty gas tank design. To demonstrate this, the program showed footage of a truck exploding when being hit from the side, ostensibly as part of a safety test. It was later revealed that the explosion had been staged. Not only had the truck's gas cap been intentionally loosened, but an explosive charge had ignited the fireball. GM sued the network, and the journalistic credibility of NBC News suffered for years because of this pseudoexperiment.

Pseudoexperiments as Social Activism

While ratings-driven journalism is a common source of pseudoexperiments, many laypeople use them to raise awareness of social issues. For example, in 2018 a San Antonio woman named Stacey Alderete recorded herself entering her child's school. She had just dropped her daughter off and returned to the school after grabbing a backpack. She's seen in a short cell phone video following others through the main entrance and walking through a hallway. She's seen by several people but not confronted by any security staff.

To Alderete, it was a bold experiment that exposed a glaring—and possibly deadly—flaw in school security, one that could be exploited by a would-be mass shooter. The day after posting the video to YouTube, Alderete appeared at a public school-board meeting and said, "I proved yesterday just how vulnerable to violence or school shootings our children are at the high school. My video speaks volumes." She later added, "If I was able to do this without being detected, ANYONE CAN!" That interpretation was embraced and widely shared on news and social media (Bates 2018).

A more parsimonious explanation is that she was recog-


Mother walks through Texas high school without being stopped, calls for better security
By JOSIAH BATES
STACEY ALDERETE
abc NEWS
WATCH | Mother walks through Texas high school without being stopped, calls for better security

nized. Alderete did not slip into the school unnoticed with a suspicious item; she was seen and (correctly) recognized as a nonthreatening mother of a child attending there. A young male carrying a gun, or even a large backpack, would arouse more fear and suspicion than an adult woman who's been seen at the school many times before. The mere fact that she wasn't personally confronted by security, of course, doesn't mean that her presence was unnoticed. It's entirely possible that she was seen on surveillance cameras by security staff who recognized her as having dropped off her daughter earlier and assumed she was returning to give her child a forgotten item or message.

It was later revealed that Alderete had an ulterior motive for her pseudoexperiment; it wasn't conducted to objectively test school security but instead because she had lost a re-election campaign as a school board member, emphasizing security. "Ms. Alderete is simply a disgruntled former board member that lost her last election and has spent a lot of her time since then trying to create havoc for the school district," Superintendent Abelardo Saavedra said. He also noted that it was "totally ridiculous" for Alderete to claim that she had exposed security flaws, because as a former school board member, she is a "fairly high-profile parent" and widely recognized by school staff and security (Caruba 2018).

Celestia Ward, in an article on "outrage vampires," described a typical social media pseudoexperiment by YouTube influencer "Joey Salads" and his 2016 viral video exposing the scorn that breastfeeding women face:

> The so-called experiment contrasts a sexy woman in a low-cut top with a young breastfeeding mom, both sitting on a mall bench "for science!" We see the attractive model receive plenty of glances, and one fellow even sits down and hits on her. Then, after the title "Now lets see how people react to Breastfeeding" [*sic*] flashes, we see the young mother heckled over and over again. In this two-minute video, four separate people hurl the same word, "disgusting," right at her, and each time she meekly apologizes "I'm sorry, he's hungry." All these disgusted mall denizens also had an approach I've never seen in real-life situations. Rather than just grumbling or expressing their distaste in whispers as they amble by, each person walks right up to the young mother, stands in a position easily captured by the camera, and delivers the insult clearly and loudly … as if they had been coached on what to do. It was only one of many similar faked videos by Salads, who, when asked, "Why do you feel the need to fake an experiment?" replied he was "just trying to make something shocking and create controversy." (Ward 2018)

Other similar stunts include videos by a man named Adam Saleh, who claimed he was removed from a Delta Airlines flight because he spoke Arabic and was accused of being a terrorist. Like Alderete, he recorded the incident and posted it online, generating news headlines and anti-racist outrage. However, other passengers disputed Saleh's claims, reporting that he had lied: Saleh was not merely speaking Arabic but shouting on the plane, being disruptive and confrontational—clearly hoping to provoke a response from ordinary passengers that he could falsely portray as racism that would be sensational enough to go viral. In fact, "Saleh is a serial prankster who frequently makes YouTube videos in which he pulls stunts on flights. His YouTube channel features films in which he conducts 'experiments' to determine how passengers will respond to travelling alongside Muslims and people speaking Arabic" (Boult 2016).

Adam Saleh
@omgAdamSaleh
NEW VIDEO IS UP!!
COUNTING DOWN IN ARABIC ON A PLANE EXPERIMENT!!
Hope you all have an amazing day
Much LOVE :)
COUNTING DOWN IN ARABIC ON A PLANE EXPERIMENT!!
YESTERDAYS PRANK: https://youtu.be/6ZWfxxCmdW0
Twitter: http://www.Twitter.com/omgAdamSaleh Facebook: ...
youtube.com
1:40 PM · Feb 9, 2016 · Twitter for iPhone
451 Retweets 958 Likes

Another social justice pseudoexperiment made national headlines in 2014 when a viral video showed a woman walking along New York streets with some men catcalling behind her. The video, filmed and released by an organization called Hollaback, initially garnered widespread attention (with over 40 million views) and praise, hailed as an important social experiment revealing the scope of street harassment and catcalling. But it soon attracted controversy when its status as a pseudoexperiment was revealed.

People began taking a closer look at what the video did—and didn't—show, what it revealed, and what it concealed. Nearly all the men seen catcalling, whistling, and making propositions at the white, conventionally attractive actress were people of color, mostly African American men. The video was clearly edited; she allegedly walked for nearly ten hours, but the video was just two minutes long. The footage wasn't merely sped up; instead only a tiny percentage of it was seen. Few suspected that it was outright staged (as Joey

Salads's and Adam Saleh's videos had done), but this raised the question: Was the segment shown really representative of her experience during the walk, or did the editors cut it to make it seem that blacks were disproportionately harassing the woman? Part of that answer was related to where she walked and when.

The social justice video itself soon smacked of racism, and experts took a closer look. Professor Zeynep Tufekci (2014) analyzed the video, noting:

> I've taught Introduction to Research Methods to undergraduate students for many years, and they would sometimes ask me why they should care about all this "method stuff," besides having a required class for a sociology major out of the way. I would always tell them, without understanding research methods, you cannot understand how to judge what you see. The Hollaback video shows us exactly why.

Tufekci's excellent analysis is too complex to treat here; see her article "Hollaback and Why Everyone Needs Better Research Methods."

Advertising Pseudoexperiments

Pseudoexperiments have been a staple of advertising for generations. Countless side-by-side comparisons have "proven" how much better the hero product is versus the leading brand of everything from removers for stubborn laundry stains to car waxes—while leaving out important caveats and differences between the two.

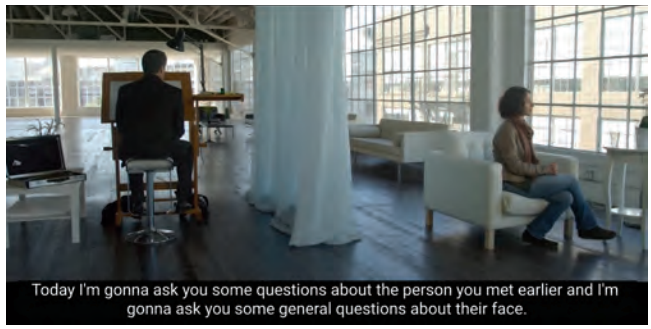
In recent years, companies have used social media to share advertising pseudoexperiments, often in the hope they will go viral, amplifying their reach. One famous example is a series of short videos created by Dove/Unilever, a 2013 campaign called Real Beauty Sketches. In it,

> Dove hired former police forensic artist Gil Zamora to illustrate some psychologically revealing sketches. In a campaign created by Ogilvy Brazil, a series of women described themselves to Zamora in minute detail, from behind a curtain. The artist in turn created composites as though trying to identify a criminal. Next, each participant was asked to describe another woman present. The results are dramatic and sort of moving. Viewing the two sketches side by side—one based on self-description, one from a friendly stranger—it's clear how unflattering the women's own self-assessments are. (Berkowitz 2013)

The campaign was enormously successful, generating nearly 70 million views on YouTube and praise as empowering and poignant from news media, media critics, and feminist organizations. Soon critics noted flaws in the pseudoexperiment, suggesting that the advertisement didn't quite "prove" anything.

For one thing, the positive descriptions of the women in the video were rooted in what's conventionally attractive: thin, mostly Caucasian, with blue eyes and smooth complexions. Whatever the intended message, the focus was still on appearance (which is to be expected from a cosmetics company). From a research design point of view, it's not clear why Dove assumed that self-descriptions would (or should) match descriptions by other people. This is due in part to *demand characteristics*: people tend to respond in socially appropriate ways that make them appear kind and positive. People—especially women—tend to err on the side of humility when describing themselves to others, so as not to appear vain. As Autumn Whitefield-Madrano wrote in her book *Face Value: The Hidden Ways Beauty Shapes Women's Lives*, "We [women] learn that women aren't supposed to refer to themselves with words bolder than *reasonably attractive*" lest they be seen as vain (Whitefield-Madrano 2016, 58).

Similarly, people tend to be kind when describing the appearance of others so as not to appear cruel or mean-spirited. When being asked by an interviewer—on camera no less—to describe another person's appearance, few of us would be eager to highlight their flaws. The sketch artist was also aware of the pseudoexperiment's purpose and may have consciously or otherwise guided his depictions according to the client's goals.


Today I'm gonna ask you some questions about the person you met earlier and I'm gonna ask you some general questions about their face.

Thought Pseudoexperiments

Of course, not all experiments are done in the real world. Philosophers, social scientists, and others engage in what are called thought experiments, whereby using various premises, assumptions, and rules of logic they can imagine what would, or should, happen given certain premises or conditions. They are usually framed as a rhetorical question intended to expose a real or imagined hypocrisy or double standard. Thought pseudoexperiments are common on social media, in which, for example, a meme (often rhetorically) asks the reader to compare two people or situations and typically directs them to (an apparently self-evident) conclusion. These thought pseudoexperiments typically involve political, environmental, or social justice issues and are framed to provoke outrage or righteous indignation.

Examples include memes such as "Imagine if [Harvey]

Weinstein was black" under a photo of Bill Cosby's mugshot, suggesting that if the Hollywood producer were black, he would already be arrested and convicted, even though the cases are quite different. There are countless variables in the two cases. Race is certainly one of them, but there's no reason to think it's the only—or even the most important—one. It's not a real experiment; it's just asking us if we can imagine person A swapped out for person B in situation X. Unless you have the imagination of a turnip, the answer is always yes. We *can imagine* a scenario in which the outcome is as described. But that doesn't mean it is likely or even probable (for other examples, see Radford 2019). Similar memes compare two newsworthy people who got unusually long (or short) sentences for (allegedly) similar crimes, but from different socioeconomic strata. It's rhetoric thinly disguised as a neutral, objective question, akin to a conspiracy theorist "just asking questions." But if those premises are biased, skewed, or wrong, then the conclusions drawn from them will often be flawed.

Experiments versus Pseudoexperiments

Flawed experiments are common, but they may not have the same potential to mislead that pseudoexperiments do. From skeptical, media literacy, and critical thinking points of view, there are several flaws inherent in pseudoexperiments.

Perhaps most obviously, they emphasize anecdote over data, and anecdotes about a social problem are not necessarily valid evidence about that topic. The question is not what happened to one person in one specific case but instead whether that case is representative of the larger group or population. Pseudoexperiments always have an obvious agenda, so in that regard it's not an experiment at all. In scientific experiments, manipulating the data is a grave transgression; in pseudoexperiments, manipulating the data is the whole point. There's also a filedrawer effect: if a person conducts a pseudoexperiment and it doesn't turn out how they wanted it to, nobody sees it—or they simply edit out the inconvenient bits.

A second fallacy is failing to consider alternative explanations. Legal outcomes in court cases are especially vulnerable to misrepresentation in pseudoexperiments. People can cherry-pick examples all day to suit their needs. If you want to find a case where a wealthy white male was accused of something horrible and "got away with it" (whatever that might mean in a given context—from charges being dropped to an acquittal at trial, a mistrial to probation) presumably due to status and privilege, you can do it. The same is true if you swap out any of the variables: rich or poor, male or female, gay or straight, black or white, and so on. In mere minutes, an internet search will turn up some case, somewhere, in which a given category of person did (or didn't) "get away" with some presumably outrageous crime or act, plausibly due to whichever factor the presenter wishes to highlight. Often the cases are notable and newsworthy *precisely because* they're exceptional and unusual. Ordinary people doing ordinary things—or receiving statistically average sentences for ordinary crimes—rarely make the news. Selection and confirmation biases direct us to the dramatic, unrepresentative outliers and make inherently flawed examples for comparison.

Pseudoexperiments point the audience to a single, seemingly self-evident, overriding factor to the exclusion of others. The factor being highlighted could certainly be the main reason for the disparity, or it may have played a part, or it could have been wholly irrelevant. There's usually no way to know without a much closer look at research and statistics. In many cases, the overall point or "larger truth" of the meme or experiment is valid, but the pseudoexperiment chosen to prove or demonstrate that claim is not.

Pseudoexperiments are powerful because they're simple, easily digested, and effective at pushing buttons and provoking anger and outrage. They can also cause harm. The examples discussed here may make parents and children feel less safe in schools and in public; make Arab Americans feel less welcome on passenger airlines (or more self-conscious about speaking Arabic); make nursing mothers feel uncomfortable breastfeeding their babies in public; reinforce racist stereotypes about catcalling black men; and so on. Some of these are attention-seeking hoaxes, while others are misguided social justice stunts. Regardless of the methods and motivations, pseudoexperiments mislead and misinform. The real world is complex and hard enough to understand without pseudoscientific pseudoexperiments. ■

Acknowledgment

Thanks to Susan Gerbic for suggesting this article.

References

Bates, Josiah. 2018. Mother walks through Texas high school without being stopped, calls for better security. ABC News (February 23). Available online at https://abcnews.go.com/US/mother-walks-texas-high-school-stopped-calls-security/story?id=53304996.

Berkowitz, Joe. 2013. Forensic artist proves women literally don't know their own beauty. FastCompany.com (April 16). Available online at https://www.fastcompany.com/1682797/forensic-artist-proves-women-literally-dont-know-their-own-beauty.

Boult, Adam. 2016. Prankster 'kicked off flight for speaking Arabic'—Delta Air Lines defends actions. *The Telegraph* (December 22). Available online at https://www.telegraph.co.uk/news/2016/12/22/prankster-kicked-flight-speaking-arabic-delta-airlines-defends/.

Caruba, Lauren. 2018. Former South San ISD trustee gets school trespass warning. MySanAntonio.com (February 24). Available online at https://www.mysanantonio.com/news/education/article/Former-South-San-ISD-trustee-gets-school-trespass-12704155.php.

Radford, Benjamin. 2019. Misleading memes as cloaked propaganda. Center for Inquiry blog (June 21). Available online at https://centerforinquiry.org/blog/misleading-memes-as-cloaked-propaganda.

Tufekci, Zenyep. 2014. Hollaback and why everyone needs better research methods. Medium (November 3). Available online at https://medium.com/message/that-catcalling-video-and-why-research-methods-is-such-an-exciting-topic-really-32223ac9c9e8.

Ward, Celestia. 2018. Outrage vampires versus breastfeeding moms. Center for Inquiry blog (July 17). Available online at https://centerforinquiry.org/blog/outrage-vampires-versus-breastfeeding-moms/.

Whitefield-Madrano, Autumn. 2016. *Face Value: The Hidden Ways Beauty Shapes Women's Lives*. New York: Simon and Schuster.

Benjamin Radford is a research fellow of the Committee for Skeptical Inquiry and deputy editor of the Skeptical Inquirer.

The Continuing Assault on Science by Creationist Group Reasons to Believe

Christian ministry Reasons to Believe promotes old-earth biblical creationism by shunning unsupportive evidence, enshrining supernatural causation, and transgressing scientific logic.

BRIAN BOLTON

On a Sunday morning in early February 2020, I attended a presentation at a local Baptist church titled "Science and Faith: Finding Truth in All Things." The speaker was Anjeanette (A.J.) Roberts, a staff member with Reasons to Believe (RTB), a Christian ministry headquartered in Southern California that promotes old-earth biblical creationism.

Roberts is a pleasant person with an academic background in molecular biology, specializing in virology. I had anticipated that she would address the topic of "theistic science," the pseudo-discipline that incorporates Christian beliefs into scientific claims. Instead, the presentation was mostly her Christian testimony with some scripture reading and a variety of anecdotes. It concluded with a prayer.

When leaving, I received a complimentary copy of *Building Bridges: Presentations on RTB's Testable Creation Model*, Reasons to Believe's latest overview of the ministry's version of biblical creationism. Published in 2018, it consists of six brief chapters by Fazale Rana, A.J. Roberts, and Jeff Zweerink.

It's a remarkable publication because the essays demonstrate beyond any doubt that Reasons to Believe's creationism model is not science. It is in fact the very antithesis of scientific reasoning, because the authors start by assuming they know the truth—biblical Christianity—and then search selectively for evidence that is compatible with their faith.

Christian Faith, Science, and Creationism

Jeff Zweerink is an astrophysicist who specializes in intentional design from multiverse theory, dark energy and dark matter, and exoplanets. He speaks and writes on the compatibility of faith and science. The following quotes summarize his perspective.

- "The universe that God revealed to us through the Bible matches the universe that we see when we study creation."
- "It seems natural to conclude that when we see design it is because a designer exists and created the universe to support humanity."
- "Not only does the scientific evidence demonstrate the rationality of belief in God, I would argue that God's existence provides the best explanation of our scientific understanding of the universe."

A.J. Roberts became a Christian at age twelve when she became convinced of the gospel message of Jesus's atoning

death and resurrection. She has expertise in microbiology, immunology, and infectious diseases. Her special interest is integrating science and Christianity, as illustrated by the following quotes.

- "As a Christian who is also a scientist I often use scientific discoveries to help others see how God reveals himself to us in creation."
- "I believe that this evidence strongly supports a view of progressive creationism and a common design model. God created life, over long epochs of time, according to specific kinds."
- "In contrast to the restrictive commitment to naturalistic explanations, a Christian or theistic paradigm is actually better for science. If we seek we will find when we seek with all of our heart. This is a promise of Jesus, recorded in the gospel. Thanks be to God!"

Fazale Rana is a biochemist who has written about the origins of life, the cell's design, and the creation of life. He is dedicated to communicating to skeptics as well as believers the evidence for God's existence and scripture's reliability. The following quotes express his Christian viewpoint.

- "There is scientific merit to a view that regards human beings as the product of a creator's handiwork, specially endowed with intelligence and the capacity for speech—qualities necessary for beings assigned as God's vice regents on Earth and that align with the image of God."
- "The human genome appears to be far more elegant and sophisticated than we could have ever imagined. It displays features that bespeak a creator's handiwork."
- "If we allow ourselves to relax the philosophical (nonscientific) restrictions on science, we are free to admit that the data from anthropology supports the notion that human beings are God's exceptional creations."

Christian Anxiety and Science Denialism

These testimonial statements by the authors of *Building Bridges* establish unequivocally that their Christian faith constitutes the framework and filter through which they interpret scientific findings. The universal causal explanation for everything that exists is the god of the Holy Bible. All phenomena must be integrated into the Christian worldview, and nothing makes sense otherwise.

As Rana emphasizes, "If human evolution is truly a fact, then there can be no ultimate meaning or purpose to human existence, then human life has no inherent value and people lack any dignity, then we are not accountable to a creator." In other words, life is completely meaningless without the assurance and direction of Christian faith.

Rana's declaration is obviously not a scientific statement but instead an expression of utter dependence on belief in a cosmic father figure, referred to as the "divine mind" and "divine creator." Based on their testimonials, it can be concluded that Roberts and Zweerink agree wholeheartedly with Rana's avowal.

Because the three authors have backgrounds in traditional scientific disciplines, it is reasonable to expect them to be versed in the philosophy and methodology of science. This expectation is not realized. In their efforts to justify the distortion of science by making it subservient to Christian theology, the Reasons to Believe creationism advocates commit four major violations of the principles of logic and scientific investigation.

Rana's declaration is obviously not a scientific statement but instead an expression of utter dependence on belief in a cosmic father figure.

1. Selective Acceptance of Evidence

In his chapter on human origins, which concludes with "The Scientific Case for Adam and Eve," Rana mentions only the evidence that can be viewed as compatible with, or at least not contradicting, Reason to Believe's divine creation story. In a previous discussion of this serious violation, I gave twenty examples where Rana and colleague Hugh Ross rejected the scientific consensus, because they said accepting the evidence would compel them to deny the biblical foundation of their human origins model (see "Sorry, 'Theistic Science' Is Not Science," Skeptical Inquirer, May/June 2018).

The basic principle of scientific hypothesis testing is that if the empirical evidence does not support the claim being evaluated, then it is the hypothesis that must be rejected or modified, *not* the evidence. Rana and Ross have the logic of hypothesis testing backward. They assume the truth of their Bible-based hypothesis and dismiss all evidence that fails to support the Reasons to Believe theological conception of human origins.

2. Invoking a Designer

The Reasons to Believe creationism model considers shared biological features of organisms evidence of "common design, not common descent." To justify this explanation, the pre-Darwinism theological conception of archetypal designs that existed in the mind of the first cause is invoked. The originator of this idea was nineteenth-century British biologist Sir Richard Owen, who defined the archetype as "an exemplar on which it pleased the Creator to frame certain of his living creatures."

Rana summarizes by saying, "In Owen's view, the archetype existed only in God's mind and was manifested in the created order in the form of shared biological features, thus representing a teleology of a higher order." This religious explanation is the basis for Rana and Roberts's numerous references to the appearance of design in the basic expressions of life on earth. Based on an entirely different rationale, Zweerink states repeatedly that the universe "looks like" it was designed for life.

Rana and Ross have previously described Owen's proposal as a respectable scientific explanation, which it obviously is

not. It clearly involves a theological explanation for observed regularities in nature, a claim that cannot be subjected to objective evaluation. Specifically, the mechanism is impossible to verify or refute, because the archetypes are alleged to exist only in God's mind, a hypothetical entity that is beyond examination by science. It is more parsimonious to assert that the causal agent (God) exists only in the human imagination.

3. Supernatural Causation Defended

Rana complains endlessly that methodological naturalism is unfair to theists, because supernatural beliefs are not accepted as legitimate explanatory concepts in the scientific endeavor. He then alleges that this restriction renders science an "inherently atheistic enterprise."

The reason for this exclusion is incontestable: there has never been one single demonstration of a supernaturally caused event. The best modern example of the failure to document a common supernatural claim is the case of Christian prayer. Five major replicated clinical trials carried out by devout Christian investigators demonstrated conclusively that God doesn't answer prayer (see "Have Christians Accepted the Scientific Conclusion That God Does Not Answer Intercessory Prayer?," *Free Inquiry*, December 2018/January 2019).

Yet Rana repeatedly pleads for a "relaxation on the restrictions of methodological naturalism," so that theological explanations such as those invoked by the book's authors can be treated as scientifically verified causal factors. Rana's argument is really pointless for two reasons: there is no scientific support for claims of supernatural causation, and Rana and his colleagues disregard this undisputed canon of science anyway. Instead, they view the natural world exclusively through the lens of their Christian faith.

There is a straightforward distinction between science and faith. Science has proven to be the best strategy for ascertaining knowledge about the natural world. In contrast, faith is the exclusive "mode of knowing" about the postulated supernatural realm.

No assumed supernatural agents or processes—not gods or devils, not angels or demons, not prayers or curses—can cause or influence events in the real world. Purported knowledge of the supernatural is accessed through faith, whereas reliable information about the natural world is discovered through science.

4. Creationist Illogic

Two of the authors, Rana and Roberts, commit the logical error of arguing that alleged problems with the overwhelming evidence for human evolution actually constitute support for their old-earth biblical creationism beliefs.

This false-choice fallacy would be valid only if there were only two possible explanations for human origins and only one could be correct. In this hypothetical circumstance, evidence that discredited one claim would constitute support for the other. But this is not the case here.

In fact, there are numerous competing creationism scenarios, including three very different biblical creation formulations (young-earth, old-earth, and intelligent design), as well as many other religious creation narratives, such as Hindu, Confucian, and Islamic, and the creation stories of native peoples around the world, including Australian Aborigines and American Indians. All these stories are just as reasonable as Reason to Believe's Bible-based version.

I suggest that an initial step in resolving this creationist confusion would be for the Reasons to Believe staff to hold a summit meeting with representatives from Answers in Genesis (young-earth) and the Discovery Institute (intelligent design) for the purpose of developing a unified Christian view of the origin and history of humankind on earth that all Christians could endorse.

Of course this would not be easy, given the long history of disrespect, acrimony, and disparagement among the participants. For example, Answers in Genesis leaders have charged that the Reason to Believe's creation model "contradicts Scripture, assaults God, and undermines the gospel."

On the other hand, in his introduction to *Building Bridges*, Rana stresses that nothing is more effective when reaching out to adversaries, whether they be skeptics, nonbelievers, secularists, or people of other faiths, than establishing friendships first. Surely this advice applies to fellow Christians too.

For all biblical creationists, the central complaint about evolution is that humans are reduced to just another species of animal. This is unacceptable to many Christians, because the Genesis account of separate creation supports the fundamentalist dogma of "human exceptionalism."

One point on which all Bible-based creationist approaches must agree is the exact process by which God created humankind, because scripture is unambiguous on this assertion. God created humans in his image (Genesis 1:27), forming the man from dust (Genesis 2:7) and the woman from the man's rib (Genesis 2:22).

Doesn't this unequivocal specification provide the biblical platform for an affirmative program of exploratory investigation that would put a unified Christian creationism model on a solid foundation of scientific research?

Conclusion

It's clear from the essays in this slim volume that Reasons to Believe is no longer attempting to achieve legitimacy in the mainstream scientific community but rather has decided to direct its efforts to indoctrinating Christian believers in its idiosyncratic and incorrect view of science. Instead, its members should publicly acknowledge that their work is entirely an expression of their sincere Christian faith and end their embarrassing misrepresentation of the philosophy and methodology of science. ■

Brian Bolton is a retired research psychologist and university professor whose contributions in psychological measurement, personality assessment, and rehabilitation psychology have been recognized by universities and psychological societies. He lives in Georgetown, Texas.

Magic in the House of Rain

Cognitive Bases of UFO 'Observations' in the Southwest Desert

Popular culture frequently conflates Native American beliefs with UFO ideas, certainly—and perhaps especially—in the Southwest desert. An experimental study demonstrates mechanisms of this bizarre concept.

MATTHEW J. SHARPS, SIMRAN NAGRA, SETH HURD, AND ALEXIS HUMPHREY

Certain peoples of the American Southwest plant turkey feathers in their fields, mystically intended to attract rain. Farther south, the wild turkey represents the rain god Tlaloc, whose dwelling beneath the vast American deserts is still, in places, believed to be blessed with abundant water. The dwelling place of Tlaloc is the House of Rain (Childs 2006), and the desert is its roof.

In the twelfth century CE, the rains failed. The roof of the House of Rain, the vast desert landscape of the American Southwest, became even more desiccated than usual, and people began to die (Childs 2006; Reid and Whittlesey 1997).

This great dying of the peoples of the Southwest, and of their sophisticated civilizations, took many forms. Most of these cultural disasters are yet to be fully understood: mass migrations, violence, and general societal disruption throughout the desert realm are visible at many archaeological sites (e.g., LeBlanc 1999; LeBlanc 2003; Reid and Whittlesey 1997).

Yet the desert ruins, the mute remains of the great societies of the House of Rain, provide examples of ingenious technical triumphs in the face of lingering and frequently homicidal drought. These remain at Mesa Verde and Walnut Canyon; in the mountain engineering of the Mogollon and Salado; in the simple but brilliantly effective constructions of Homolovi, one of the last places of communal refuge from the solar monster of climate change; and in the amazing canal system around modern Phoenix of the Hohokam.

Most of the Hohokam canals no longer exist as archeological artifacts. Many were re-built in the same places by modern engineers, in mute testimony to the expertise of the Hohokam who discovered the relevant topography in the first place. But you can still see one of the last of these great artificial waterways in the sparsely visited Park of the Canals in Mesa, Arizona. Seeing it, you begin to appreciate the enormous native expertise in civil and hydrological engineering that allowed their civilizations to exist in this hot and barren place.

These tremendous engineering works are clearly the most magnificent monuments to these ancient peoples. So it's with a certain sense of dismay that one enters the tourist areas of the region. Just look around as you drive through Sedona—you're immediately assailed with the idea that the whole place is up to its neck in the mystical, magical nature of the Ancient Ones and, oddly, in the space aliens frequently credited with ancient native achievements.

Look around as you drive through Sedona—you're immediately assailed with the idea that the whole place is up to its neck in the mystical, magical nature of the Ancient Ones.

Get out of your car and look around a bit more. You can seek out vortices, or sacred places, frequently associated with UFOs. You can commune with ancient spirits and with their UFO alien buddies, who will direct your life, loves, and forays into something akin to an Ancient Desert Spirit World. Space alien depictions are everywhere, somehow conflated with the ancient native peoples.

Oddly, in the tourist spots, you won't hear a thing about the astounding scientific and engineering feats of ancient Southwestern indigenous peoples, the evidence of which is everywhere. This is the *real* story—that the ancient civilizations of the Southwest were composed of real people, living at the extremes, and that they faced these extremes with extraordi-

Figure 1: Detail of the desert, Hovenweep National Monument, with two "UFOs" in attendance.

nary resiliency and technical skills.

Those skills are eminently worthy of modern study. Non-Eurocentric approaches to civil engineering may be of vast importance in a world of rapidly increasing multicultural populations, all of which need clean water. Yet we typically see little scientific acknowledgment of this fact or research on the crucial principles involved (e.g., Sharps and Hess 2010). Instead, we essentially see cultural appropriation: the imaginary transformation of the tough, practical people of the Southwest's past into ethereal visions of cardboard mystics, dancing in obeisance to unknown gods from outer space and spiritually acceptable to the alien-seekers of the Southwest's present.

The high civilizations of the Southwest desert of course supported complex religious systems, as do high civilizations everywhere. Much of the relevant religious information is not available to those outside specific cultural classes of specific tribes (e.g., Waters and White Bear Fredericks 1963). Most cultures around the world reserve hierarchies of religious beliefs for those trained in local theology (e.g., Frazer [1890] 1981), and the House of Rain is no exception. Thus, much of the ancient religious thinking of the Southwest has been lost, and much that remains is not accessible to outsiders.

But is the view of modern Southwestern cultural appropriation of Native beliefs really fair? Is it possible that beliefs in this newly minted, UFO-based, Southwestern spirituality are actually valid in some sense? Or can we account for them simply, skeptically, and scientifically, in terms of known psychological processes?

We conducted the following experiment to find out.

Serendipitous Stimuli

While making photographs for another research project at Hovenweep National Monument in southeastern Utah, the first author ill-advisedly changed lenses on his Sony Alpha digital camera in the beginning of a minor sandstorm. As an unintended result of the wind and the dirt, two dust particles clung to the internal system of the camera. The inadvertent imaging of these dirt particles resulted in two round, slightly out-of-focus "UFOs" in the sky, always in exactly the same places on each subsequent exposure (see Figures 1–3). As the author continued to photograph "background" footage for the other project (pictures including terrain, surrounding ruins, and wildlife), the three stimulus photographs of the present study emerged: a picture of the desert with two "UFOs" in attendance (Figure 1); a picture of part of an ancient ruin with the UFOs still in place (Figure 2); and a picture of part of an ancient ruin with a raven sitting on it with the faithful UFOs still in attendance, in formation, and in exactly the same relative places in the photograph (Figure 3).

Twenty-one male and seventy-six female respondents were recruited from the psychology department of a California university. This university has articulation agreements with the highly multicultural community college system of the region, resulting in a reasonably valid sampling of the current American population. Respondents were provided with Figures 1, 2, and 3. In the control group, respondents were told that these images were "over desert mountains" (Figure 1), above "an … Anasazi ruin" (Figure 2), or there was "a common raven" in the same picture (Figure 3).

Figure 2: Detail of the desert, Hovenweep National Monument, with two "UFOs" in attendance, incorporating a picture of part of an ancient ruin.

In the experimental group, respondents were given the same information but were also informed that these images were recorded in a desert area "in which a great many UFOs and alien encounters have been reported." (This is true. A lot of people in pursuit of personal revelations from the Eagle Gods take some time off to seek out their flying-saucer allies in the same places.)

Respondents were also informed that this was an area in which "Sky People" have been seen as particularly important (absolutely true, from the UFO fans' perspective) and in which the Raven was seen as "having enormous spiritual power among Native peoples … as a creator … protector … supernatural" (also true in some Native American beliefs). Respondents were then asked, on a Likert-scale (1–7 basis), questions about what they believed they had seen in the photographs. They were also requested to write about what they thought they had seen.

Results

The good news is that 35.4 percent of our respondents

Figure 3: Detail of the desert, Hovenweep National Monument, with two "UFOs" in attendance, incorporating a picture of part of an ancient ruin with a raven perched on it.

thought that our UFOs, the two fuzzy dots in the pictures, were "camera issues." That's what they were.

The bad news is that 14.1 percent believed, explicitly, that the dots were spacecraft or UFOs. An additional 18.2 percent didn't use the term *UFO*, but they believed that these dust specks were *inanimate or animate objects flying above the earth*—pretty much the definition of UFOs. We wind up with a grand total of 32.3 percent of modern adults who believed that these two dots were UFOs in the sense of alien aircraft.

So, about one third of our modern population saw these fuzzy dots as UFOs; this is perilously close to the other third who quite sensibly and correctly saw the same dots as something wrong with the camera. This is also close to the approximate 30 percent, in our recent publication in Skeptical Inquirer (Sharps et al. 2019), who generated completely erroneous visions of nonexistent cultural and geographical features on an "artificial planet," based on nothing other than context-appropriate suggestions.

There were a few exceptional cases. One individual thought the dots were "spirits." Other idiosyncratic ideas included earth aircraft or spacecraft; the unimaginative but relatively sane "two black dots"; and the idea that the specks were there "for no reason" (diplomatically inoffensive, true, but deeply bizarre if you actually think about it).

But the important finding here: about one third of modern adults, people who get to vote, thought these two dust specks were alien starships or something unknown but similar, which was just about the same number of people who correctly thought there was something wrong with the camera.

About one third of modern adults, people who get to vote, thought these two dust specks were alien starships or something unknown but similar.

Multivariate analysis of variance showed, at a significance level of $p < .05$, that those receiving the UFO-intensive "experimental group" information were significantly more likely to endorse the following ideas:

1. That the two dust specks on the camera lens were real objects;
2. That at least one dust speck was an intelligently controlled vehicle;
3. That the vehicles in question may have been piloted or remotely controlled from some other "ship or station"; or
4. That "at least one of these objects is an extraterrestrial spacecraft of similar vehicle, and neither is an explicable, natural phenomenon of the Earth."

However, the experimental group was *not* more likely to endorse the idea that "it is possible that one of the objects is some kind of shadow of the other one, so that I am actually seeing one flying object and some form of visual reflection of that object." We'll see why this is important below.

Discussion

The primary result of this experiment is very clear. Human beings, if provided with a *prior cognitive framework*, will respond according to that understanding. Human responses will be rooted in that prior framework (Bransford and Johnson 1973; Sharps 2017), even if the framework in question is full of UFOs.

Therefore, between the prior cognitive framework created by the influence of alien-nonsense media and an ill-informed view of ancient Southwestern peoples as vaguely magical, alien-ridden beings, many people are easily persuaded to believe in relevant mystical/UFO nonsense in the ancient Southwest.

And this is what we found. In the present experiment, all we had to do was present two dust specks as *possible* alien starships, and presumably rational people were perfectly willing to accept these specks as emissary vessels of the space aliens to their Southwestern spiritual children.

But recall that the UFO *experimental* group was *not* more likely to endorse the idea that "it is possible that one of the objects is some kind of shadow of the other one, so that I am actually seeing one flying object and some form of visual reflection of that object." As discussed above, many respondents in the experimental, UFO-information group tended to see the photographs as involving UFOs, but this statement derailed and defeated that rather obviously incorrect ideation *for this same group*. Why?

In several articles in cognitive gerontology, representation theory, forensic cognitive science (see Sharps 2003; Sharps 2017 for review), and also in the realm of paranormal thinking (e.g., Sharps et al. 2016), the first author has discussed the continuum of gestalt to feature-intensive processing (G/FI) in the realm of human cognition. FI (feature-intensive) processing occurs when the features of a given situation are brought into consideration, yielding slower but more detailed cognitive solutions. G (gestalt) processing occurs when fewer features are considered, yielding faster and less detailed solutions (see Sharps 2003; Sharps 2017 for further discussion).

In the present experiment, we provided respondents with either a UFO-rich prior cognitive framework for consideration or one that did not provide this cognitive framework. The UFO framework resulted in more nonsensical alien-based thinking. Such thinking tends to be gestalt (G) in nature (see Sharps 2003; Sharps 2017). Fewer specifics of the given situation tend to be considered in G processing, resulting in a less detailed, relatively vague cognitive representation for the respondent.

However, when we asked respondents to think about a possible shadow effect in the question discussed above, the net effect required respondents to engage in *feature-intensive (FI) processing*: they had to slow down cognitively to create mental images of the stimulus elements in their minds and ultimately to juxtapose them in reasonable patterns of shadows and realities. When they did this, the resultant mental

activity increased the essential cognitive resources devoted to the problem, which increased their relative depth of processing (e.g., Craik and Lockhart 1972). This in turn shifted their cognitive processing from relatively abstract and ethereal gestalt thinking to relatively specific, and therefore logical, feature-intensive representations—with a corresponding enhancement of their abilities to perceive reality as it is. They began to reject supernatural concepts, specifically those involved in UFOs and their alien pilots.

This is crucially important: the present results are consistent with previous studies (e.g., Sharps et al. 2016; also see reviews in Sharps 2003; Sharps 2017), indicating that conditions fostering feature-intensive processing are more conducive to accurate cognitive outcomes than those involving faster, but more vague, gestalt outcomes (see also Sharps and Nunes 2002). If you think about things point-by-point, in feature-intensive depth, you are less likely to consider them erroneously than if you accept a faster and easier—but less-detailed—solution in gestalt terms. Truth, in short, lies in the details, but you have to think about the details—in feature-intensive terms—to find it.

Participants began to reject supernatural concepts, specifically those involved in UFOs and their alien pilots.

It is strongly suggested here, and by these data, that an avoidance of mystical beliefs is best found in feature-intensive, detailed cognitive consideration of any given phenomenon in question. This is what modern skeptical education should foster, according to the most comprehensive cognitive representational principles extant at this point in the history of science.

Popular mystical views of the American Southwest, at least in terms of their space alien provenance, are shown here to be primarily a psychological phenomenon rather than one grounded in any reality other than the convoluted laws governing human cognition. Modern people, the beneficiaries of modern science and engineering, may see the Southwest as a land of mystical nonsense. They may see the ancient Southwestern peoples as the spiritual heirs of vague space alien magic rather than as the practical, hydrologically ingenious inhabitants of an unforgiving land that they actually were.

But the fact is that mystical space aliens have nothing to do with the Southwestern landscape, the vast white deserts and red rock arches and cliffs, of the Southwestern peoples' habitation. Rather, the realm of this essentially magical thinking is exactly where one might rationally suggest: in the mind of the thinker. More specifically, the dynamics involved lie in the gestalt cognitive tendencies, with their corresponding reduction of step-by-step logic, of the given thinker.

Were that thinker to engage in the more detail-oriented, more productive feature-intensive cognitive abilities of which we are all capable, the ultimate beliefs might be less alien-intensive and more appreciative of the extraordinary technological achievements of the tribal peoples who inhabited the House of Rain, the harsh environment of the Southwest desert.

It might be considered somewhat insulting to the memory of the brilliant Anasazi, Hohokam, Mogollon, Salado, Sinagua, and other unnamed Southwestern technologists—who for a period triumphed over a terrifyingly unforgiving landscape—to believe otherwise. ■

References

Bransford, J.D., and M.K. Johnson. 1973. Considerations of some problems of comprehension. In W.G. Chase (Ed.), *Visual Information Processing.* Orlando, FL: Academic Press.

Childs, C. 2006. *House of Rain.* New York: Little, Brown, & Co.

Craik, F.I.M., and R.S. Lockhart. 1972. Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior* 11: 671–684.

Frazer, J.G. (1890) 1981. *The Golden Bough: The Roots of Religion and Folklore*. New York: Avenal.

LeBlanc, S.A. 1999. *Prehistoric Warfare in the American Southwest.* Salt Lake City: University of Utah Press.

———. 2003. *Constant Battles*. New York: St. Martin's Press.

Reid, J., and S. Whittlesey. 1997. *The Archaeology of Ancient Arizona.* Tucson: University of Arizona Press.

Sharps, M.J. 2003. *Aging, Representation, and Thought: Gestalt and Feature-Intensive Processing.* New Brunswick: Transaction Publishers.

———. 2017. *Processing under Pressure: Stress, Memory, and Decision-Making in Law Enforcement.* Flushing, NY: Looseleaf Law.

Sharps, M.J., and A.B. Hess. 2010. Ecocognition: Decision and understanding in environmental context. *ReVision* 31: 85–89.

Sharps, M.J., S. Hurd, B. Hoshiko, et al. 2019. Percival Lowell and the canals of Mars: How to see things that aren't there. Skeptical Inquirer 43(6) (November/December): 48–51.

Sharps, M.J., S.W. Liao, and M.R. Herrera. 2016. Dissociation and paranormal beliefs: Toward a taxonomy of belief in the unreal. Skeptical Inquirer 40(3) (May/June): 40–44.

Sharps, M.J., and M.A. Nunes. 2002. Gestalt and feature-intensive processing: Toward a unified theory of human information processing. *Current Psychology* 21: 68–84.

Waters, F., and O.W. White Bear Fredericks. 1963. *Book of the Hopi.* New York: Penguin Books.

Matthew J. Sharps is professor of psychology at the California State University, Fresno. He is the author of numerous papers and publications in cognitive and forensic cognitive science, including the 2017 book *Processing under Pressure: Stress, Memory, and Decision-Making in Law Enforcement.* He has consulted on eyewitness issues in numerous criminal cases and published several articles in SI on the implications of eyewitness principles for erroneous observations and interpretations.

Simran Nagra, Seth Hurd, and Alexis Humphrey are research students in Sharps's Laboratory for Cognitive Science, California State University, Fresno.

What Are the Chances?

Because they are erroneously perceived as having extremely low probability, cases of significant, unusual coincidence are often cited as evidence for the paranormal. The true probabilities are almost always much higher than initially supposed.

TONY PASQUARELLO

Actually, the night had been neither stormy nor dark. But her sleep was restless and fitful; virtually nonexistent. Temperature was a big part of the problem: she must have added to, removed, and adjusted the bedding a half-dozen times. And now, the wee hours—5 a.m., 6 a.m. When the phone rang, she was definitely in a hypnopompic state, foggy and groggy. But, in just a few moments, she'd be hyper-alert. The voice went on and on, with each wrenching sentence adding bitter details of the tragedy; she felt the predictable effects in her eyes, her throat, her whole being. Suddenly, she gasped. She saw … no … she was transfixed by the digital clock. Its crimson numerals—searing, burning digits—branding her brain with their uncanny significance. She realized the shocking truth: the call had come at the precise time showing the birthdays of the couple involved! That couldn't be just a coincidence. No way! What are the chances? They must be one-in-a-million. Or maybe a billion.

Where does this sort of event fit in the usual paranormal categories? One website lists more than thirty species of the paranormal. Everyone recognizes telepathy, clairvoyance, psychokinesis, and remote viewing—along with ghosts and spirits.

Devising a taxonomy of the paranormal can be frustrating, because we never get to touch base with reality; we never get to examine a genuine specimen from the vast, untidy, paranormal zoo. The task is something like herding imaginary cats.

Synchronicity

Here is another event that would qualify as "more than coincidence": In an accident 2,000 miles from home, the person saving your life has your identical first and last names. However, if your hotel clerk had your name, that probably would seem "just a coincidence."

I was prepared to claim that these sorts of phenomena have not been given sufficient consideration or any handy generic term. Then, just a bit more internet exploration revealed otherwise. No less a luminary than Carl Jung was discussing "meaningful coincidences" just about a hundred years ago and developed his ideas more fully at mid-century. He referred to these events as "synchronicities" and saw them as "expressions of a *deeper* order." Apparently, the interconnectedness of the collective unconscious occasionally bubbles up into the public, conscious sphere.

However, neither the term *synchronicities* nor the definition as "temporally coincident occurrences of acausal events"

captures the very thing that makes them interesting and controversial—their surprising nature, the assumption of extreme improbability that rules out chance as the explanation. After all, for any given moment, there are an infinity of synchronous, acausal events, viz. almost all the pairs occurring at that time. But the events in question are those for which it is claimed that they cannot be "mere" coincidence—the claim is that something more is involved, an element that "paranormalizes" the coincidence.

At least one thing is fairly clear—the term *synchronicities* never caught on. I instead suggest Coincidence Plus (C+) as a more convenient class term, where the "+" represents the allegation that something more than coincidence is involved. C+ also handily covers *concurrent*, *convergent*, and all the other "con" terms that might be appropriate. And for a retired professor, inscribing "C+" is a familiar activity.

Muddled Millions

C+ events are those that, almost reflexively, elicit the rhetorical exclamations (pseudo-judgments) "one in a million" or "a million to one"—the perennial, presumed answers to the rhetorical title question, "What Are the Chances?" Actually, references to a million as some sort of zenith stem from the first half of the twentieth century. The "million-dollar baby from a five & ten-cent store (selling china)" provides a glimpse into the economy a century ago. I recall wondering, in the 1940s, whether my dad could ever reach the ultimate middle-class pinnacle of $10,000 a year. Those were the days when Rockefeller was just about the only millionaire who came readily to mind. But a "million to one" was usually the wrong answer then and is still the wrong answer now that the U.S. population has tripled.

Recognizing that various "million" slogans are rarely serious probability estimates, nevertheless, constant repetition has a way of creating a psychologically favorable climate. In the current political ethos, it is often noted that repeating a lie often enough can make it seem true. Repetition legitimizes the subject and suggests possibility, if not actuality. Natural humility in skeptics, perhaps most people, makes them reluctant to call anything impossible. Just so can the rhetorical be taken as literal; repetition creates reality. Just consider, for example, the freakish file of bizarre paranormals stalking across our TV screens every evening. Even a commonsensical person could be forgiven for asking "Can they *all* be imaginary?" By the way, the correct answer is "Yes!"

Even the "million-dollar baby"—if the implication is that her charm is one in a million—is grossly misleading. In fact, the ratio of very attractive women—or men—is closer to one in fifty. Indeed, if some event that applies to all really has an empirical probability of a million-to-one on any given day, then, by definition, that "improbable" happening is happening about 330 times in the United States today! If you live in a fairly large city, it's happening near you two or three times! Or, consider the chances of winning $10,000: seems quite remote, right? Then think of all the casinos, lotteries, drawings, and of course Las Vegas. It's happening, frequently—and it happened to me!

Another facet of the problem was recently brought home by a striking coincidence—but not a C+. While working on this very article, I overheard some TV character saying "There were a million or a billion." Naturally, my ears perked up. Upon reflection, I decided that I had heard a notably crazy disjunction: the speaker was uncertain about something being a certain size—or instead one thousand times larger! That would be like being unsure whether a gathering was the size of the Buckeye football team or the capacity crowd at Ohio Stadium. And that is obviously absurd. People don't usually make quantitative mistakes on the order of a thousand-fold! I suspect that the script writer was prone to a common error—thinking that billion means "two million."

Getting Down to Cases

In crafting a sensible response to the title question, we have to abandon the murky swamp of the paranormal and the amorphous clouds of the hypothetical and do the obvious—a real world analysis. I decided to select an average, four-person, Midwest, middle-class family—mine. It consists of two children, a boy and a girl, two years apart. These are the actual birthdates:

A. 4-13-33
B. 8-27-33
C. 8-17-58
D. 8-07-60

A considers 3 and 4 to be special, significant numbers, while the other three favor 7 and 8.

It is essential to directly address a possible charge that my "average" family is a biased sample because of the latter three covering all the sevens in August. While that may appear to be slightly unusual, think of the thousands of four-person families where all four members evince some pattern or other. Then, think of the virtually limitless number of "orderly" arrangements that the numbers 0–60 can exhibit for three or four persons. These range from simple serial succession (22, 23, 24, 25) to arithmetic sequences (2, 4, 8, 16; 3, 6, 9, 12) to more esoteric sequences such as pi, e, or Fibonacci. The number will be very large indeed.

We are trying to provide a concrete answer to the following question: What are the chances that a phone call disclosing some significant (even traumatic) event will come at the same time as the digital clock's showing the significant dates (birthdays, etc.) of the event participants? The call may come from one of the family separated from the others or from another person. If the latter, more numbers will become available targets.

A reasonable assumption is that such a call, especially if the event occurred in the very early morning hours, would come between 7 a.m. and 8 a.m., out of consideration for the person called.

If we have all the relevant data and have correctly partitioned the complex event into appropriate subsets, all is ready. After all, in calculating probability, it is not that the math is hard; knowing how to analyze the situation to decide which

items will be going into the calculations can be the difficult part.

From 7 a.m. to 8 a.m., the clock will show sixty different times. Given the foregoing, these will be, *prima facie*, "significant" hits: 7:00, 7:03, 7:04, 7:07, 7:08, 7:13, 7:17, 7:27, 7:33, 7:37, 7:47, 7:58.

I'd plead the case for two others as obviously significant: 7:11, a commonly understood symbol for speedy shopping—particularly, off-hours. For any activity remotely connected to shopping, 7:11 will be taken as a hit. Then, 7:31, easily seen as reversing the bad luck of 13, can be a hit for any event involving "reversal"—an accident while backing up, exchanging usual lunch seating, etc.

The clear, first-stage answer to the title question/scenario is fourteen out of sixty, very nearly 25 percent—the probability of this type of C+ event. Needless to say, nothing like a million-to-one.

Moderate Manipulation

Suppose that the event in one case is somehow related to an unusual meeting between B and D. Then, if the idea occurs to someone, the time 7:34 (27+7) could be taken as a C+ hit. Likewise, for 7:20 (27-7) if the two are separated. The time 7:15 (15=60÷4) might be a hit if a heated political argument divides A and D. Permitting just one arithmetic or quasi-arithmetic step produces a host of new possibilities.

The four-person table contains twelve one- and two-digit numbers, specifying birthdays. Taken two at a time, there are sixty-six possible pairs. The numbers in each pair can be added or multiplied (producing two new numbers); subtracted or divided (four new numbers); or exponentiated (two new numbers). They can also be conjoined, placed alongside each other—a nonmathematical operation—in two different ways. Hence, simple one-step operations produce a lot of new candidates for C+ status, even though many will be too large—e.g., 13^{17}—to be relevant. So the probability of a C+ increases.

Recognizing that the family's special numbers—3, 4, 7, and 8—constitute direct hits, what of attempting to evade those numbers? What if the call comes at 2:59, 5:29, or 9:52? Well … 2+5=7; 5-2=3; 9-5=4; etc. Simple steps and there are the special numbers. How about 10:12? It's too easy: 1+1+2=4; 10+1+2=13; etc.

Given almost any small group of small numbers, some juggling—just a few simple steps, with a plausible justification for those steps—will produce the desired number or pattern. We might call this property of numbers their "pliability" or "patternability."

Ambiguity and Vagueness

Often, in actual usage, ambiguity and vagueness are considered negative characteristics; they're bad things about language to be eliminated. But for our purposes (context is always the arbiter), it is just a fact that most terms have more than one meaning or large gray areas of applicability.

There is nothing remotely ambiguous or vague about the numbers themselves, or the mathematical operations, whatever the ontological status of numbers may be. But the symbols standing for those numbers and operations do exhibit the normal, generous helpings of ambiguity and vagueness.

Consider some cardinal number homonyms: one-won; two-to-too; four-for; eight-ate; nine-nein. The ordinals—second, fourth, and fifth—are obviously ambiguous, with strong connotations. Number terms in other languages could come into play, as could Roman numerals.

When we turn to the operations, we find a host of synonyms, many with strong emotive associations. Addition: plus, join, combine, meet. Subtraction: minus, lessen, take away, remove. Multiplication: procreate, proliferate, times. Division: separate, into, take apart. Exponentiation: raised, to the power.

Suppose the "call" comes at 2:25, 2:52, or 5:22 and involves a "7" person and some achievement related to dance. For example, someone is finally named prima ballerina after numerous attempts. The time can then be interpreted as uncannily predictive: 2+5=7; 5=Roman Numeral V=V for victory; 22=two-two=tutu. Voila! A classic C+ event.

Absurd! Outrageous! Of course—but not to the fantasy prone, paranormally inclined mentality, anxious to find the hand of the supernatural in every possible unusual occurrence.

Furthermore, coincidences such as our initial example constitute a fertile field for the application of a type of retrofitting—not necessarily devious—so often discussed by Joe Nickell. The retrofitting actually creates the C+. Consider how loose the concept of the "call" is. The first ring was really at 7:15; phone answered at 7:16; event announced at 7:17; call ends at 7:21. Any or all of these could be termed "the call." A recipient of the call who had not noted the clock could be thinking of the dramatic news sometime later, still either distraught or exhilarated. If the event involved persons D (7) and C (17), it would be quite understandable if retrofitting occurred—"My God, the call must have come at 7:17!" (Even if it came at 7:49!) Thus a C+ event that never happened is created without deliberate guile.

Same Birthdate Paradox

For the thirty or so folks at the bar, it is a very good bet (70 percent) that at least two will have the same birthdate (month and date). Most people hearing this are astonished, even disbelieving. Why? Explaining sheds light on the C+ phenomenon, because they are structurally identical. In this case, as in most others, the average person does not know the correct odds and does not know how to go about calculating them. The question is misunderstood as "How many people are necessary for there to be a good chance of matching my birthday?' Naturally, the mind immediately jumps to 365, the days in a year. Even when the question is clarified, we may persist in thinking the odds are 365 to one, a tiny probability. Psychologically, there is an almost natural reversion to the "one-in-a-million" syndrome, the instinctive reaction to anything perceived as having extremely low probability.

Whether the coincidence is about birthdates, phone calls and clock times, or others, there appear to be two conditions for a C+ event:

1. The probability of the event is initially thought to be extremely low, such that coincidence can't be the "whole story"; there must be "something else" at work. (The religious version would often term these events miraculous.)
2. The event cannot be considered trivial; it must be sufficiently dramatic to hold high emotive significance for those involved.

And the Chances Are ...

It is time to answer the title question. Given the stipulated parameters, a C+ event like the "call" has a probability of about 25 percent, a not insignificant figure. That calculation matched only birthdays to clock times. But surely in real life other significant dates, such as ages and anniversaries, will be utilized. If two parties are ages seventy-five and fifty, no doubt 7:50 would be judged a direct, meaningful hit. With four numbers representing ages and three numbers for an anniversary, in many cases, there will be up to seven new numbers for matching. The new ratio could then be 21 out of 60 for a hit. That's 35 percent.

Permitting just one arithmetic or quasi-arithmetic manipulation surely raises the probability to much better than 50 percent. Finally, a clever zealot with enough creative imagination to finagle the numbers using the additional interpretive possibilities extensively discussed—in that event—a hit is a virtual certainty, *no matter what time the call comes*.

We have attempted to analyze some of the most prominent and compelling of the C+ events and shown that the probability is almost always much higher than supposed. Hence, in showing that the surprise is *logically* unwarranted (but understandable), we eliminate the need to invoke the paranormal.

This same psychologically fascinating mindset takes place in a variety of cases. We may initially experience astonishment (wondrous delight or revulsion). Then, in the course of time, we learn the true inner workings of some phenomenon—yet we are still astonished. The moon, flowers, and childbirth (and eating insects, for the revulsion part) come readily to mind. Perhaps the most illuminating analogy can be found in the attitude of the thousands of observers who, this very day, are enjoying the feats of a magician. Both the viewers and the magician know that no real magic is involved; nothing paranormal required. Yet viewers are still mystified and—the magician hopes—enchanted.

A Postscript Probability Puzzle

In that vast aforementioned Ohio Stadium (cap. 105,000), what are the chances that the person seated next to you has the same birthdate?

Were this found to be the case, those involved would probably consider it a C+ event and likely use typical locutions to characterize it: It must be a sign; We were destined to meet; There is an ultimate purpose; This was not by accident; etc.

In solving the puzzle, pay careful attention to initial responses. Did the large number create an adverse reaction? Did the "million-to-one" syndrome rear its ugly head? Did some ambiguity infect your understanding of the problem? Two helpful hints:

1. About 300 attendees will share your birthdate.
2. In most cases, there are two people next to you.

In keeping with our thesis, while first impressions may lead someone to assume extremely low probability, the actual chances are not that low. They are nowhere near a million-to-one—and about ten million times better than winning Publishers Clearing House sweepstakes. ■

Tony Pasquarello, emeritus professor of philosophy, The Ohio State University–Mansfield (1966–1986) has written some fifty articles in *American Atheist*, *Free Inquiry*, and Skeptical Inquirer, as well as the humorous quasi-autobiography, *The Altar Boy Chronicles*. He is also a professional pop/jazz/classical pianist. He wrote an SI cover article in Spring 1984 titled "Proving Negatives and the Paranormal." Unfortunately, he spends too much time in Vegas keno tournaments.

When Environmentalism Clashes with Science

DIBAKAR DAS

Protecting the environment is a worthy goal. The quality of our lives depends on the quality of the environment. We all need clean air, clean drinking water, and healthy food to have a healthy life. Poor air quality increases the risks of respiratory illnesses. Degrading soil health and warming global temperatures challenge continued food production. And deforestation, air and water pollution, and excess use of chemicals in food production only make things worse. The conservation of many endangered species of animals depends on protecting their environment. Protecting the environment is also important to contain man/wildlife conflicts, which often end badly. Wild animals driven by habitat destruction often attack human settlements in search of food, and in the worst scenario may help spread new diseases. The responsibility to protect the environment is therefore natural in most of us.

This tendency to care deeply for the environment, although useful in most instances, sometimes leads to irrational behaviors—ones based more on emotions than science. This issue merits some consideration in the interest of science and scientific thinking in general.

As people are becoming more environmentally aware, a form of environmentalism fashioned in exaggerated interpretation (and sometimes science denial) is growing among some youth. Secured in innocent emotions to protect and worship mother nature, this form of environmentalism looks similar to dogmatic religion in some aspects. It is often blind in opposition, based on emotions, and fierce in response to criticism. While I do not want to brand everybody who cares for the environment as a new religionist, the tendency of innocent youth to stand out as environmentalists at every occasion without being skeptical is dangerous and contrary to scientific thinking. This almost cult mentality may obstruct constructive and useful discussion—for example, whether we should go "all organic." The environmentalist I am talking about, of course, will say yes, even if a strong case could be

The tendency of some youth to stand out as environmentalists without being skeptical is dangerous and contrary to scientific thinking.

made against the proposal.

What drives this form of environmentalism and makes it difficult to dispel is the blurred overlap between true science and environmentalism, making it fertile ground for propaganda. Environmentalism has often prompted people to share misinformation, believe in popular rhetoric—such as the Amazon rainforests are the lungs of the planet contributing 20 percent of global oxygen—and ironically promote the ineffective "pray for [cause here]" trends on social media. Although the Amazon rainforest is important for the general well-being of the planet, it does not emit 20 percent of global oxygen. While believing in such misinformation may not be immediately harmful, this gullible attitude can push people to take positions not based on factual or scientific evidence on important decisions.

Take the example of the GMOs in agriculture. Fake environmentalism stands in the way of science and attempts to block technologies that can improve the lives of millions. To cite one example of irrational and violent behavior inspired by such environmentalism, in 2013 activists in the Philippines illegally destroyed the golden rice trials at the International Rice Research Station. The anti-GMO activists tirelessly attack science and continue to mislead people about the safety of GMOs, despite scientific consensus that they are generally safe. This kind of environmentalism can be dangerous and has parallels to religion.

We need not get into details of the GMO controversy; think instead of simple tree planting. As people around the world are increasingly becoming climate conscious, planting

The anti-GMO activists tirelessly attack science and continue to mislead people about the safety of GMOs.

trees has become a visible activity in communities. People are even celebrating birthdays by planting trees. Planting trees is not bad—but careless tree planting is. If you are climate conscious and want to protect the environment (as everyone should be), I bet you are not going to read a couple of research papers on tree planting before you plant two of your own. But it would be better if you did, because the act could be counterproductive. A study has shown that improper tree planting in riverbanks can have negative consequences on the water cycle. Reforestation efforts often use new, nonnative species of trees that may become invasive and prove detrimental to the local ecology.

To battle climate change, we need more technological interventions, for example, fast and fuel-efficient transport—not bicycles for seven billion people. We need to produce enough food to feed the growing population without clearing more forest lands for cultivation. That's where technologies such as GMOs and gene-edited crops—which many environmentalists oppose—can help. So a mere concern for the environment without understanding the science in a larger context can actually harm the environment in the long run. The blind, aggressive protests of so-called environmentalists to GMOs is similar to that of conservative Christians to evolution. Both live in denial of science.

A mere concern for the environment without understanding the science in a larger context can actually harm the environment in the long run.

Often what starts as an environmental protest soon turns into a political activity. As people are united by shared emotions and beliefs, it becomes easier for politicians to turn those feelings to their own favor. While we need politicians to understand environmental issues, the unwarranted mixing of politics and environmental concerns can be dangerous and lead to political instrumentalization of environmental protection. Our judgments and concerns for the environment should be guided by science-based evidence instead of emotions or opportunistic politics.

We should not move forward with ideas before clearly understanding them and their implications. We should certainly not believe every environmental narrative popular in the media. We should not engage in counterproductive activities such as those that destroyed the golden rice trials in the Philippines. Instead, we can educate ourselves on how simple behaviors can help protect the environment. Let us put our trust in the women and men who understand science—or at least bother to try. Let us protect the environment while we also protect the integrity of science. Let us promote science and scientific thinking for a better society. ■

Dibakar Das is a senior PhD student in agricultural plant sciences at Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India. He writes for the Genetic Literacy Project and has a keen interest in science, promoting science communication, and scientific thinking.

Turning Magical Thinking into the Magic of Critical Thinking

Joe Nickell

Kathryn Hulick's *Strange but True: 10 of the World's Greatest Mysteries Explained* is a refreshing addition to the strange-mysteries genre—all the more so because it is a children's book.

Books of this genre typically go wrong in one or more specific ways. For example, they may be essentially mystery-mongering texts. That is, the author is so intent on fostering a mystery as to exaggerate and omit facts, deliberately rendering the proffered mysteries unsolvable for the average reader.

Another approach is to offer the proverbial "both sides" to controversial topics such as UFOs, ghosts, or Bigfoot. This risks leaving it to the *reader* to separate science from pseudoscience or to sort good arguments from bad—a failed approach if the *author* is missing in action.

Still another approach is simply to lean strongly toward magical thinking—as if the difficulty of solving some mysteries implies the existence of the paranormal or even the miraculous (examples of the illogic of "arguing from ignorance"). Books following the one-sided approach may even be deliberately biased toward a single special topic, for instance "Strangest UFO Encounters" or "Bigfoot Unsolved."

In contrast, Hulick's motivation is admirable. She aims to capture the interest of young readers—as well, I deduce, as those who are still young at heart, who have that enduring quality common to children, scientists, detectives, and many others: curiosity. Let me share a little story.

Once at a conference, the great scientist and inventor, my late friend and

Strange but True: 10 of the World's Greatest Mysteries Explained. By Kathryn Hulick. Illustrated by Gordy Wright. Frances Lincoln Children's Books, Quarto Publishing, Minneapolis, MN, 2019. ISBN 978-1-78603-784-8. 127 pp. Hardcover, $22.99.

CSI Fellow Paul MacCready, hailed me, down the aisle of a shuttle bus, to announce, drawing some attention, "Joe, I'm reading your book *The Magic Detectives*!" With some mischief, I replied, "It's for children, Paul!" This drew a big laugh from people, and he joined in. Then he wagged his finger and said, "But you don't talk down to your readers," going on to say he was enjoying reading and learning from my selection of paranormal adventures. I'm sure he would have liked Hulick's book too.

Again and again, Hulick shows she knows her stuff—the fruits of thorough research—and she presents concepts clearly, mindful of her readers. She has consulted various scientists and skeptics (and I am pleased to make a few cameo appearances myself).

In case after case—"The Haunted Mansion," "The Search for Lost Worlds," "The Secrets of an Ancient Tomb," and so on—Hulick gets her facts straight, then draws the reader more deeply into critical thinking. Describing the great desert drawings of the ancient Nazca people, for instance, she brings in the fanciful notion of Erich von Däniken that they were "signs to beings approaching them from great height": extraterrestrials.

Soon, however, she is giving readers a much more reasonable explanation—one backed up with evidence. Hulick states correctly the prevailing theory about the lines: the Nazca probably "walked along them during religious rituals and used some shapes as gathering sites." Moreover, "The remnants of offerings, including smashed pottery and seashells, have been found nearby."

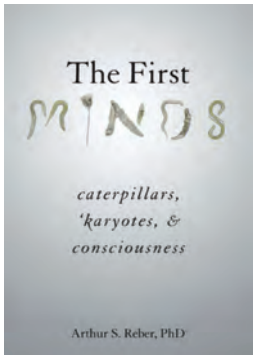
For her chapter on lake and sea creatures, "Monsters of the Deep," I shared with Hulick an experience related to me by a wildlife technician. While banding ducks on a New York lake in dim light, he suddenly spotted a giant undulating lake serpent. But as the astonishing view continued, he realized he was seeing some otters that his mind was connecting into a single, serpentine creature!

Hulick is skilled at creating word pictures, but here, as often throughout the book, she is ably assisted by illustrator Gordy Wright. He captures the otter illusion for all to experience. The duo should be proud of what they have created. It will pay dividends for a generation—and beyond. ■

Joe Nickell, PhD, is CSI's senior research fellow. He is the author, coauthor, or editor of nearly fifty books.

How Does It Feel?

Peter Kassan



The First Minds: Caterpillars, 'Karyotes & Consciousness. By Arthur S. Reber. Oxford University Press, 2018, ISBN-13: 978-0-190-85415-7, 296 pp. Hardcover, $35.

Imagine we're robot scientists who have been observing the universe since its origin with the big bang. After eight or nine billion years or so, a remarkable new phenomenon arose: life.

We'd have to develop new theories to account for this new phenomenon, with entirely new vocabularies. These new-fangled things we dubbed *organisms* were sensitive to their surroundings (inanimate and animate, other organisms like and unlike themselves) and to their own internal states. Organisms weren't just innocent bystanders but were engaged in behavior that furthered their own interests—they had *agency*. They didn't behave mechanically or automatically but responsively and intentionally. They showed flexibility, novelty, and even creativity.

We'd say that organisms were *sentient*—conscious of their surroundings and their internal states. We'd study this phenomenon of consciousness. It would be a challenging topic of study, and it would keep us busy, but it would be no different in kind from the study of, say, nucleosynthesis. (We robots would take the third-person perspective in studying this new subject.)

But we're not unintrospective robots, and we haven't failed to notice that we ourselves are conscious. We have no choice but to take the first-person perspective, which gives rise to the entire problem: consciousness seems to be not just a new phenomenon but a new *kind* of phenomenon. All the stuff (time, space, matter, energy, particles, waves, fields, causality, and so on) that we use to account for everything else seems utterly inadequate to make sense of feelings, sensations, and perceptions; pains and pleasures; sights, sounds, tastes, smells, and feels; recognition and misapprehension; thoughts and ideas; wishes, hopes, and fears; knowledge and belief; learning, memory, and forgetting—not to mention false memory, dreams, hallucinations, and optical (and other sensory) illusions.

Arthur S. Reber, emeritus professor of psychology at the University of British Columbia, has been thinking about all this for a while now—by his own account, since at least 1993. *The First Minds* presents a synthesis that, he argues, overcomes many of the problems that have beset this perennial problem for philosophy, psychology, evolutionary biology, cognitive science, consciousness studies, and undoubtedly several other fields.

As Reber is well aware, his is hardly the first book to address the subject. With so much already written, does he have anything to add? He does—even if he doesn't succeed in really putting any of the major issues to bed. As Reber presents his theory, he addresses most if not all of the major issues of the topic, including emergentism and reductionism, embodied cognition, "hardware-independent" consciousness, philosophers' zombies, the epistemology and ontology of consciousness, and the "hard problem" of consciousness. He also includes the major stances toward the topic, including eliminativism, behaviorism, functionalism, dualism, panpsychism, and mysterianism, as well as the major thinkers on it, including Daniel Dennett, David Chalmers, Cristoph Koch, Patricia Churchland, Anthony Damasio, Richard Dawkins, Hubert Dreyfuss, Thomas Nagel, and many, many others (the author index consists of three double-columned pages).

Contrasting himself with the many other authors who have addressed "the problem of consciousness," Reber asserts, "I'm not going to attempt that." Actually, he does. The modesty is not sincere. At the conclusion, he finally admits: "Surely, it won't come as a surprise that I think I'm on to something important here."

Reber's theory—what he calls "the cellular basis of consciousness" (CBC)—is easily stated, which he does almost immediately, in the preface:

> (1) The origin of mind and consciousness will be found in the simplest, single-cell organisms; and (2) consciousness, subjectivity, phenomenal experience (or if you prefer,

sentience) is an inherent feature of living organic form(s).

Reber argues from an evolutionary perspective: although endless novelty arises throughout the origin of species (the cell nucleus, mitochondria, photosynthesis, sexual reproduction, multicellularity, endothermy, specialized cells and organs such as neurons and the brain, wings and flight, and on and on), the fundamental features of life persist and are conserved. From the very origin of life, even the most primitive archaea had to have been sensitive to its immediate surroundings and its own internal states. For that reason, Reber argues, to understand consciousness we must look first at the single-celled organism rather than the object of our speciocentric fascination—the human brain.

Other scientists agree. As Reber notes, the journal *Animal Sentience* began publication in 2016. The use of the word *sentience* here (as in the second of Reber's two central theses) is telling. As he writes a little later, "I'm going to be playing fast and loose with words."

This, however, is a problem. *Sentience* is "feeling or sensation *as distinguished from perception and thought* [empahsis mine]." Is Reber really asserting that a unicellular organism has a mind? Actually, he is. "There is, I will argue, something that it is to be like a paramecium or an amoeba or a bacterium." Granted, even the most primitive unicellular organism is *sentient*. And, yes, sentience is the seed from which animal consciousness (including human consciousness) flowers—but the seed is not the flower.

As Reber acknowledges, in life's long history, new phenomena have emerged continually. *Emergence*, in fact, is such a problem for his theory that the word occurs in one form or another some 150 times in the book. He devotes an entire section to it, in which he writes: "Every theory of the origins of consciousness must confront the Emergentist's Dilemma. … Working out how these miracles occur is always going to be a problem."

Indeed, the problem is not simply to identify the origin of a phenomenon but also the mechanism. We recognize that the most primitive unicellular organism, for example, consumes and digests food. That hardly explains the evolution, development, and function of the alimentary canal in multicellular animals. Yes, the unicellular organism is sentient and responsive to its surroundings. But that doesn't even begin to account for the development and function of the brain and the rest of the nervous system, much less the phenomenology of consciousness.

Closely related to the issues of origin and emergence is whether a function that originated in a unicellular organism persists in the cells of a multicellular one. Are the trillions of cells in our own body not merely alive but actually sentient? Do we harbor an entire universe of minds? Apparently, we do: "From the CBC approach, the individual cells of our bodies *are assumed* [emphasis added] to have levels of sentience rather like bacteria do."

Reber is only slightly less dogmatic on several closely related questions. One such major issue is pain. We acknowledge that all mammals, at least, can suffer. But there's no consensus on other animals. The question of whether fish, for example, feel pain is a controversial one. Reber comes down solidly on yes. Many of us humans—at least the ones who don't fish—would probably agree. But does Reber embrace the Jainist stance that all living things are capable of suffering? Well, he apparently goes even further. Jainists don't seem to worry about amoeba suffering—probably because their religion originated long before anyone knew about such organisms. But Reber quotes approvingly from an author who argued that if amoeba were as large as, say, dogs, they would obviously be seen as experiencing the same sorts of pleasure and pain as any other creature. Does that mean that they're worthy of our compassion and empathy? Reber isn't an absolutist about this, advocating only pragmatic utilitarianism—balancing the suffering of other life-forms "against the costs … [it] may have on the quality of life of humans."

Reber returns again and again to the Cartesian question of whether an organism's behavior is the result only of mechanical reactions to stimuli rather than a true mind. His argument: "The typical bacterium has approximately ten thousand individual molecular chemoreceptors arrayed along the cell. … It uses this information to direct movement toward food sources and other favorable circumstances and away from potentially tissue-damaging substances or other aversive ones."

In other words, *E. coli* is just too variably responsive to such a wide range of stimuli for it *not* to be sentient. This is, of course, the emergentist problem again. Elsewhere, Reber convincingly argues that a computer (or robot) wouldn't be conscious no matter how complex its behavior, so this argument can't be right.

Another controversy (of likely interest only to philosophers, science fiction writers, botanists, and the lunatic fringe) is whether plants feel pain. Early in the book, Reber emphasizes that motile life-forms would have had to become sentient because only organisms that could move would gain any advantage from it. (Some creatures, such as sea

squirts, pass through a motile stage and then become fixed in place, after which they lose their brain. The old joke is that this is what professors experience after they achieve tenure.) It's only toward the end of the last chapter that Reber provides the section titled "What About Plants?" He cautiously (perhaps even reluctantly) concludes that there probably *isn't* something it is like to be a cactus. But maybe plants can feel pain after all: "Put simply, vegetarians and vegans who have adopted their dietary ways on ethical grounds are going to be confronted with problems."

Early in the book, Reber justifies his theory with this:

> The CBC approach, I maintain, offers an optimal research strategy precisely because it invites ways of reconfiguring many issues in evolutionary biology, microbiology, cognitive science, and, yes, in the philosophy of mind.

Indeed, consciousness studies bear all the hallmarks of a degenerating research program—a lot of papers and little to no progress. As Reber himself acknowledges, whether the CBC sparks a renaissance of productive research remains to be seen. But the prospects are dim for a mindometer equally applicable to a person, a parrot, or a paramecium. (The temptation to better Reber's contrived subtitle is irresistible.)

Despite all this, Reber's book is a worthwhile contribution to the literature on consciousness. His work is at least solidly grounded in actual biology rather than fanciful speculation based on quantum mechanics, information theory, or science fiction. Reber provides an engaging, informative, entertaining, thought-provoking, and remarkably personal tour of the subject. ■

Peter Kassan has had a long career in the software industry, where he has been a programmer, technical writer, manager, and an executive at a software products company. He holds several software patents. An observer for some time of consciousness studies and the pursuit of artificial intelligence, he reviewed *The Feeling of Life Itself* in our May/June 2020 issue.

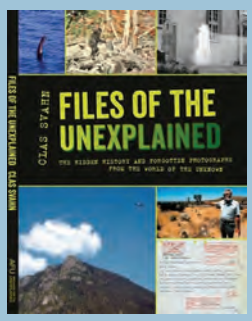
NEW AND NOTABLE]

Listing does not preclude future review.

The essential companion to inform discussions with family and friends.
Anti-vaxxers
How to Challenge a Misinformed Movement
Jonathan M. Berman

ANTI-VAXXERS: How to Challenge a Misinformed Movement. Jonathan M. Berman. A timely, comprehensive examination of the anti-vaccination movement by a medical professor who recognizes the tension in trying both to understand a movement and refute it. He provides needed historical perspective, noting that anti-vaccine movements date far earlier than Andrew Wakefield and his bogus claims, which helped launch the modern variety. He writes about the first vaccines, vaccine pioneers, immunity, ineffective "alternatives" to vaccination, social media's role, religion's role, Big Pharma, anti-vaccine activism in 2018 and 2019, the anti-vaccine parent, and what changes minds about vaccines: information. Berman's twin goals are to provide a more complete picture of the anti-vaccine movement from the nineteenth century to today and to counter popular misinformation. MIT Press, 2020, 296 pp., $19.95.

DON'T BELIEVE WHAT YOU THINK: Arguments for and against SCAM. Edzard Ernst. A welcome new book from the world's most knowledgeable and prolific researcher into claims of "so-called alternative medicine" (SCAM). SCAM is a "smokescreen of misleading claims," says Ernst, with legions of emotionally attached, near-religious believers who fail to think rationally about its dangers and abuses. In thirty-five concise essays—each addressing one commonly held belief about SCAM ("SCAM is natural," "SCAM is gentle and harmless," "SCAM is effective," "SCAM stimulates self-healing," etc.)—Ernst explains how consumers are manipulated by constant misinformation. Then, using their own motivated ignorance, motivated reasoning, and cognitive biases, they reach a form of "wishful thinking detached from reality." Ernst hopes the book enables readers to "question nonsense, call out untruths, correct falsehoods, ridicule stupidity, and disclose fake news." Imprint Academic (UK)/Ingram Book Co. (USA), 2020, 170 pp., $29.90.



FILES OF THE UNEXPLAINED: The Hidden History and Forgotten Photographs from the World of the Unknown. Clas Svahn. This is the official book of Archives for the Unexplained (AFU), a giant archive housed outside of Stockholm, Sweden, containing several million images, films, articles, and documents about ghosts, UFOs, sea monsters, unusual natural phenomena, paranormal abilities, and other enigmas. The book is a visual delight; each right-hand page has a high-quality reproduction of an interesting photograph or two (or three) from AFU's collections matching the topic described on the left-hand page. The extraordinary collection is Fortean-inclined, meaning, as Svahn writes in the introduction, "We do not judge anyone and we do not draw any preconceived notions." So, look more for neutrality than overt skepticism toward the topics pictured—although they do acknowledge the initial crop circles hoax and note the hoaxes surrounding several famous photos of Bigfoot and the Loch Ness monster. Some of the photos are familiar, but many are surprising. The result is a visual feast, all reproduced on quality paper in large format, roughly 8x10 inches. Archives for the Unexplained (available from afushop.se), 2019, 128 pp., $16.00.

—Kendrick Frazier

ADVERTISEMENT

"IF YOU'RE WONDERING IF HUMANS WALKED ON THE MOON, IF YOU'VE WONDERED WHERE THE LOST CITY OF ATLANTIS WENT, OR IF YOU'RE WONDERING WHAT YOUR CAT WILL DO BEFORE AN EARTHQUAKE, CHECK OUT *WEIRD EARTH*. . . . DON PROTHERO LAYS IT OUT FOR US EARTHLINGS—AND IT'S WEIRD."

—Bill Nye, CEO, The Planetary Society

Available in September
wherever fine books are sold.

RED LIGHTNING BOOKS
redlightningbooks.com

Skeptical Inquirer
THE NOBEL DISEASE
When Intelligent Scientists Go Weird
Humor, Cartoons Fight Antiscience
Science Fiction for Science Communication
The Chase Vault Mystery
Dubious Claims in Youth Psychotherapy, Part III

The Nobel Disease

I enjoyed the article "The Nobel Disease" (May/June 2020) so much so that I read it before even getting it into my office or bedroom stack of reading. I also enjoyed and related to the editor's comments, as I have met quite a number of Nobelists, a few with crank ideas, including Linus Pauling who was featured number one in the article. I had the pleasure of attending chem lectures as an undergraduate at Caltech, sometimes delivered by Pauling. That was a real treat, and he often would digress to other topics. The year was 1962, when he had just won his second Nobel Peace Prize. He didn't go off the rails too much over vitamin C, although he was already known to hold funny ideas about megavitamin dosages.

One slightly crazy Nobelist I knew quite well was not mentioned in the article: Hannes Alfven. This was probably because Alfven went off the rails into highly technical planetary science, not something the public noticed. Alfven won his prize for work in magnetohydrodynamics (MHD), including what are known now as Alfven waves. Unfortunately, he came to believe that magnetohydrodynamic forces were as important as gravity, or more so, in most of the processes that led to the formation of galaxies, stars, and planetary systems. For example, he believed that "asteroid families," generally believed to be the result of collisional breakup of larger original asteroids, were instead the result of "jet streaming" in the early solar nebula.

I had the distinction, rather like your editor's experience sitting across from Shockley at NAS, of having Alfven interrupt a lecture I was delivering at a NATO meeting on solar system origin. He ran up to me, grabbed the chalk from my hand, told me I was all wrong, and finished my lecture for me (jet streams, MHD, and so forth). The event even made it into an article in *The Observatory*, a fun little journal published in England. Alfven, along with his colleague Gustaf Arrhenius (who himself was not a Nobelist though his grandfather Svante was) wrote a big book titled *Evolution of the Solar System* that contained a lot of the stuff most of us mainstream theorists dealing with solar system dynamics consider wrong. We came to refer to the book and its authors as "All Vain and Erroneous."

I very much agree with your authors' and your editor's view of the "Nobel Disease." My experience from knowing quite a number of these folks (Feynman, Fowler, and several others who have some resemblance in personality even if not falling off the rails) is that they tend to get the feeling that their special knowledge extends beyond their specialties, and sometimes they can get into difficulty with unorthodox ideas.

Alan Harris
La Canada, California

The article on "The Nobel Disease" fails to mention one important component that prompts Nobel laureates (and other famous people) to espouse irrational views: the feedback these people receive from society. Nobel laureates get celebrated excessively by the media and are pressured to give answers to questions that lie outside their domain of expertise. These answers then get printed and repeated without any critical evaluation. If a Nobel laureate said it, it can't be wrong!

This is probably a consequence of the erroneous popular belief (noticeably expressed in the article) that Nobel Prize winners possess extraordinary intelligence. I don't know of any objective investigation that shows that this is so. Of the several Nobelists with whom I had direct personal contact, none of them struck me as more intelligent than, say, the top 25 percent of my professional colleagues in academia. There are hundreds of thousands of very intelligent individuals all over the world, but only a few Nobel Prizes are awarded each year. So, who gets one of those few prizes? Perhaps the lucky ones who were at the right place at the right time or those who had extra skills in self-promotion—but not the most intelligent ones as established in a quantitative scientific evaluation.

Fame, more than excessive intelligence, seems to be the root cause of "The Disease."

Carlo H. Sequin
UC Berkeley
Berkeley, California

Perhaps some intellectually adventurous people, whose very boldness of vision makes them such innovative thinkers as long as they're tethered to scientific discipline, can also slip that tether and be led astray, swayed by wishful thinking or personal prejudice. That is, their very audacity of thought can achieve either remarkable breakthroughs *or* remarkable fallacies, depending on whether it's properly moored.

Rick Schroeder
West Yarmouth, Massachusetts

I very much enjoyed the fascinating article titled "The Nobel Disease." I found it curious, however, that Linus Pauling published a paper with psychiatrist Ewan Cameron in 1979 when Dr. Cameron died in 1967. Was Dr. Pauling using old data? Did it take him twelve years to get the article published? Or did the vitamin C resurrect his old friend? My money is on the old data. Dr. Cameron, by the way—at one time president of the American Psychiatric Association, the World Psychiatric Association, and revered by many as a titan in his field—had some very strange and dangerous notions, which he was known to visit upon his trusting and unsuspecting patients.

Joseph Davis
Gibsons, British Columbia
Canada

The story about controversial Nobel laureates reminded me of how I saw a black woman sociologist leave William Shockley speechless in a TV debate on IQ forty years ago.

The fact that, on average, whites score higher than blacks on IQ tests, Shockley argued, can't be accounted for by racism or white privilege because Asians score higher than whites on the same tests.

That Asians score higher than whites proves nothing, the sociologist replied. In the absence of racism and white privilege, she posited, Asians would have scored even higher.

Taras Wolansky
Kerhonkson, New York

Your article reminded me of a statement made by CSI Fellow Robert Park while giving a talk on science, pseudoscience, and public policy many years ago, which I recall as "A PhD is not an inoculation against stupidity."

Ron Gilman
Piscataway, New Jersey

Regarding "The Nobel Disease," I recall this quote from James Watson in his 1968 book *The Double Helix:* "One could not be a successful scientist without realizing that, in contrast to the popular conception supported by newspapers and the mothers of scientists, a goodly number

of scientists are not only narrow minded and dull, but also just stupid." The irony couldn't be more poignant.

Robert Stern
Ames, Iowa

Antiscience and Belief's Power

The article "Using Humor and Games to Counter Science Misinformation" by John Cook (May/June 2020) raises valuable insights into how to combat antiscience. Every technique for so doing is important, especially the use of social media.

As a result of decades of experience dealing with college students in nonmajors biology and the general public—particularly those in the Midwest and deep South—I learned that one has to really contend with the source(s) of the science denial and misinformation.

One of the reasons it is difficult to vaccinate the population against antiscience is the blocking power of the source. Unlike developing immunity to infectious diseases, which involves inoculating and stimulating the appropriate mechanisms of the systemic immune system, inoculating against antiscience involves immunizing the brain.

Unfortunately, the irrational sources and associated mythology get to the brain far earlier than do knowledge and reason. The major source of antiscience is religion. The word *belief*, and its cognates, are devastating in protecting antiscience. God and parental authority shape mental attitudes long before formal science education has a chance to develop antiscience immunity.

Social media and general culture are very potent forces in disseminating the antiscience propaganda as well as other antisocial attitudes.

Based on my almost forty years of educational and public experience, I concluded that to counter antiscience one has to break, by whatever means possible, the hold the concept of belief has on the public.

I used to tell my audiences that the United States and the Constitution gives them the right to believe whatever they want, but just because they believe it doesn't make it true. Yet, I will never forget the spirited ovation a student in the Bio 101 lecture got when he stood up and declared: "That which I believe has more validity than any scientific fact."

Sheldon F. Gottlieb
Boynton Beach, Florida

SF Films and Science Fact

Regarding David R. Powell's article "Multiply Connected" (May/June 2020), herewith the opening paragraph of chapter 6 of the book *The Director Should've Shot You* (Centipede Press) that is a history of my half century adapting science-fiction films into novel form while struggling to fix, or at least rationalize, as much of the bad science in such films as possible:

"An understanding of the science in commercial science-fiction films typically fluctuates between the mediocre and the abysmal. The traditional cinematic tropes of guns and chases and explosions are implicit. Science, not so much. This isn't to say that every SF opus that comes out of the film factories needs Neil deGrasse Tyson as an advisor, or that the next mini-series you're going to see on HBO or the Syfy channel or Netflix has to be a straightforward, inflexible adaptation of Olaf Stapeldon's *Last and First Men*. But a rudimentary knowledge of and respect for the science referenced within the film should be a minimum requirement for development within the genre."

Having been involved with most of the projects cited in Powell's article, I can say that the standard (and this is an exact quote from two major directors) response to bad science in their films is, "But I wanted that shot." Producers hire "science advisors" for their projects not to correct the science in their films but so that when some ten-year-old points out that, for example, you cannot have people walking around in space without spacesuits, those associated with the film can reply, "But we had a science advisor!"

Alan Dean Foster
Prescott, Arizona

In his article on science fiction, science fact, and science communication, David R. Powell correctly noted that the "spinning ring," i.e., space station, depicted in the film *2001: A Space Odyssey*, constructed to create artificial gravity, would not be feasible from both a physical and pragmatic point of view. However, at least this film recognized that humans would experience weightlessness in outer space and centrifugal force was one plausible way to offset this.

In stark contrast, every science fiction film and TV series involving humans in space that I have ever seen, from *Flash Gordon* to *The Forbidden Planet* to *Star Trek* and its spinoffs to the *Star Wars* sagas and beyond, have just assumed Earth's gravity extends throughout interstellar space and crews on spaceships can casually walk around as they would back home on the ground. Many science fiction novels also implicitly assume this. I think it is safe to say that this is far and away the most common violation of the laws of nature that fans of science fiction have been exposed to since the beginning of the genre. It is as ubiquitous as the notion that all aliens whom Terran space travelers may encounter will speak English fluently—and with American accents!

Dennis Middlebrooks
Brooklyn, New York

In Powell's "Multiply Connected …" article on sci-fi and movies the quote: "Earth science students came away from watching the film *The Core* confidently believing the center of the earth was liquid rather than solid" confused me. I never saw that movie, but I'm a retired geologist and as far as I know, based chiefly on the behavior of P and S seismic waves and the existence of earth's magnetic field, geoscientists have concluded that earth's core is mostly liquid with a small solid inner core. So, if the "center" refers to the core as a whole, the students were more nearly right than wrong.

Robert Rettke
Lake Charles, Louisiana

David Powell replies:

I think the source of the confusion is the distinction between the inner and outer cores of the earth. I less than precisely said "center of the earth" in my text, but here is what the cited source says: "The students who watched The Core *had a larger tendency to think that the inner core of the earth was a liquid rather than a solid." So, the cited source makes the distinction that reader Rettke makes, and I was just using "center" imprecisely.*

Aliens There, Not Here

As a longtime SETI enthusiast, I thoroughly enjoyed "Aliens There but Not Here" by Seth Shostak (SI May/June 2020). Regarding the continuing popular belief in alien visitations and UFOs, as I suggested in "Do We Really Want to Believe in UFOs?" (SI, July/August 2015), that can be attributed in part to fears that we live in a godless or purposeless universe, but that existence of superior aliens proves otherwise.

Klaus Brasch
Flagstaff, Arizona

Seth Shostak's "Aliens There but Not Here" is persuasive and vividly written, but the assertion

that "fast-moving objects in the sky were not a thing even as recently as the nineteenth century" seems worth a comment. Perhaps not fast-moving, and not quite in the nineteenth century, but in February to May 1913, British papers reported sightings of mysterious airships. See George Dangerfield, *The Strange Death of Liberal England, 1910–1914* (1935; Capricorn edition 1961, 119–23). According to Dangerfield's brief account, some sightings were alleged to have been flocks of birds, or Venus, or a "fire-balloon, and the dirigible claims faded away. But they were a 'thing.'"

The airship fuss occurred before there were powerful radio transmissions to attract the notice of faraway aliens, and the presumed intruders were at the time assumed to be of German origin. It seems likely that persons seeing or imagining unidentified presences in the sky—especially during tense times—tend to cast the "whatevers" in familiar technological forms.

This is not a criticism of Shostak's scientific/technological analysis, just a reminder that the very different psychological/historical approach is also relevant to UFOlogical studies. It's good that SI embraces both.

Martin Berger
Youngstown, Ohio

Coronavirus Misinformation

I have two comments on Benjamin Radford's news and comment article on coronavirus misinformation (May/June 2020).

First, it struck me how confidently he declares "the death rate is 2 percent"—while renowned virologists/epidemiologists such as Christian Drosten, head of the Institute of Virology at the Charité Hospital in Berlin and advisor to the German government (and long-time researcher specialized in coronaviruses), point out that reliable numbers were not yet available, and death rates vary widely depending on regional specifics and outbreak severity (in March, death rate estimates varied between 0.3–0.7 percent in Germany up to 7 percent in northern Italy).

Second, I wonder why Radford, when listing sources for misinformation, explicitly names marginal players Tom Cotton and Sylvia Browne together with commonplaces such as xenophobia and "folk remedies" but avoids the obvious "elephant in the oval office" and similar potentates in Russia, Brazil, or Hungary, for example, whose misinformation I find much more dangerous.

Christoph Bartsch
Kassel, Germany

Benjamin Radford replies:

I appreciate Christoph Bartsch's comments and refer him to my special report in the July/August 2020 issue ("Coronavirus Crisis: Chaos, Counting, and Confronting Our Biases"), which addresses his queries regarding COVID-19 measurement uncertainties as well as governmental sources of misinformation.

Chase Vault Mystery

I enjoyed Benjamin Radford's article "Reopening the Chase Vault Mystery" (May/June 2020). It reminded me of several similarities to a frequently told ghost story about the house where I grew up.

I was raised in a large house in rural Upstate New York built in the 1820s as the Bide-A-Wee Inn on the stage route between the two nearest small cities. From my childhood up, I would occasionally hear the story about the beautiful young woman from an impoverished local family who was married off to a brute of a farmer more than twice her age. She loved to dance, but he insisted she stay home and tend to his needs only. The only times she was able to get to a dance (held at the inn where I would live some 130 years later) was when her husband was off getting drunk at an area tavern, and she would sneak to the inn. Her husband eventually grew suspicious, and he was a very, very mean drunk. One night he arrived back home before she did and waited by the door with an axe, which he used to dispatch her into the netherworld. But the legend said that her ghost continued to attend dances at the inn, and my mother said she could sometimes hear her when she continued to visit when my family lived there.

There were gaps in the story, of course. There is a notable lack of any contemporaneous records that local people talked of any ghosts in the decades before the Civil War. There is no recorded murder of a young woman, or even any evidence that dances were ever held at the inn. Plus, even before partitions were added to make the building into a private residence, the so-called "ballroom" was not big enough to hold public dances.

Why, then, did the story persist? The ghost story was known to many residents of my era but was mostly put onto the "back burner" in the context of daily living, so it was never submitted to any closer examination for plausibility. Each retelling of the story reflected the beliefs of the teller and contained the moral that the teller wanted to attach to the story. And all retellings of the story, even this one, are motivated by the desire of the teller to be proud of some noteworthy feature in an otherwise unremarkable, "nowhere" community.

Kevin Gates
Hallstead, Pennsylvania

Benjamin Radford, in "Reopening the Chase Vault Mystery," has taken a look at certain shifting coffins "legends" of Barbados. Over the years, I have uniquely discovered that most of these are pseudo-legends, *fakelore* creations, or adaptations by Freemasons. (See my *Secrets of the Supernatural*, 1988, p. 147.)

Freemasonry teaches its postulated moral truths by embedding them in allegory and symbols. It is all the same to Masons whether the basis is history or pure imagination. One of its essential allegories is that of the secret vault, which involves lost secrets, hidden treasure, and the grave. Examples I have proved include Swift's lost silver mines, the nationally famous Beale treasure ciphers (complete fiction by a Freemason), and the internationally known Oak Island money pit. (There, we now know, prominent Freemasons—including notables such as Franklin D. Roosevelt and actor John Wayne—took part in what are sometimes whispered as "open-air rituals.")

Radford noted Sir Arthur Conan Doyle's peculiar statements about the Chase vault but didn't note (what few have known, I think, until I publicized the fact) that Doyle was a Freemason. Indeed, I also discovered that several of the Sherlock Holmes stories are unquestionably constructed around allegorical secret vaults. In two of these, for example, main characters sport, respectively, a Masonic breastpin and a Masonic tiepin, while in yet another (with a "haunted crypt" and a "leaden coffin standing on end before the entrance to the vault") Holmes's client is a "Mr. Mason"!

One other Barbados restless coffins story should be added. It came in 1943, more than a century after the earlier ones, this time specifically involving *a party of Freemasons and the vault being that of the founder of Freemasonry in Barbados!*

Joe Nickell
Amherst, New York

I just read Benjamin Radford's interesting account of the Chase vault mystery in the latest Skeptical Inquirer. What struck me was the part about the moving coffins as I recalled reading a mystery novel involving that very thing when I was a youngster. After searching a bit, I discovered that it was *The Sleeping Sphinx* by John Dickson Carr, the master of the locked room mystery. It's not one of his better books, but the part about the coffins is clever. His explanation of why the coffins moved is one of the possibilities proposed in Radford's article, but I won't spoil it by telling you which one! Carr was quite clever at suggesting that the solution just might be supernatural, then eventually showing that it was all very rational. I enjoy reading Skeptical Inquirer and have my own collection of "debunking" books, a number of which are by SI authors. Keep up the good work.

Dougal MacDonald
University of Alberta, Edmonton, Canada

Lucky Numbers?

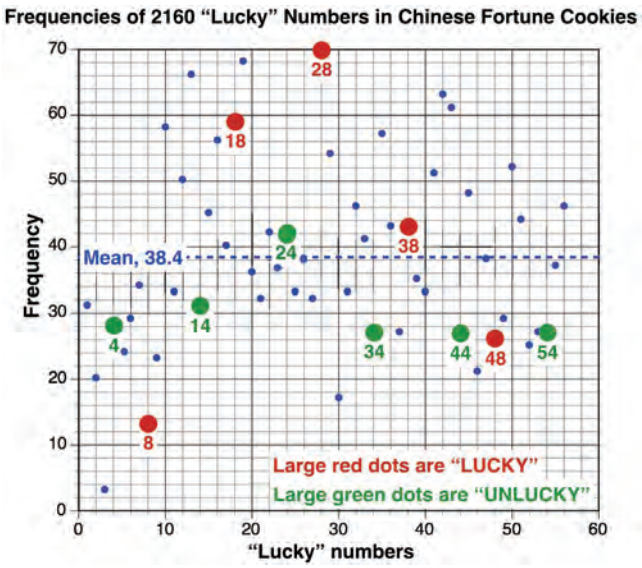
Last year, curiosity led us to start recording the "lucky" numbers in fortune cookies in weekly takeouts from a local Chinese restaurant, and we soon expanded our project by obtaining a large order of cookies directly from the supplier.

We saw little besides randomness in our plot of frequencies (notably, 7 didn't stand out, though many Americans consider it lucky) but we knew nothing about Chinese superstitions. Stuart Vyse's article, "Superstition and Real Estate, Part I: The Chinese Market" (May/June, 2020), prompted us to take a second look at our data to see if numbers ending in 8 (which Vyse reports many Chinese people consider "lucky") might appear more often than those ending in 4 (deemed "unlucky"). The accompanying plot shows frequencies of our 2,160 "lucky" numbers (mean 38.4, standard deviation 14.4). The highest frequency was indeed a number that ended in 8 (28), standing a bit more than two standard deviations (SD) above the mean. The number 18 was also well above average (by 1.43 SD). However, a stand-alone 8 occurred *less frequently than all but one other number*. The number 38 had middling frequency, and 48 fell 0.86 SD below the mean.

Of six numbers containing a traditionally "unlucky" 4, all but one (24) did have below-average frequencies (never by more than 0.8 SD), but nowhere near as dramatically as Vyse observed in Chinese advertisements. Though individual numbers gave very mixed results, the *average* frequency of "lucky" numbers was 42.2 and of "unlucky" numbers 30.3.

So, did superstitions described by Vyse influence frequencies of our fortune-cookie numbers? We'll let the reader decide!

Bryce Hand and
Kenneth B. Raniet
Syracuse, New York



Errors of Evolution

Regarding Harriet Hall's book review of *Human Errors* ("Evolution's Flaws Are in Us," May/June 2020), I believe it was Woody Allen who said, "God might exist, but if so he's an underachiever." I'm also reminded of Robin Williams's observation: "What kind of an intelligent designer builds a pleasure palace next to a sanitation plant?"

Ernest Field
Cleveland, Ohio

For the Record

In Massimo Polidoro's column about COVID-19 misinformation in our July/August 2020 issue, he mistakenly referred to the virus's DNA. Several readers have pointed out that the COVID-19 virus is composed of RNA (ribonucleic acid).

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

SKEPTICAL INQUIRER is now available for digital-only subscription.

Our digital subscribers can read the full contents of each new issue and have total access to SKEPTICAL INQUIRER's entire online archive, dating back to 1976, all without receiving physical magazines by mail.

Current print subscribers also have full digital access to our online articles and archives. Print subscribers can access the digital content by visiting skepticalinquirer.org, clicking "Activate" in the top-right corner of your screen, and then filling out the corresponding form. Our digital content is viewable on desktop, laptop, tablet, or smartphone.

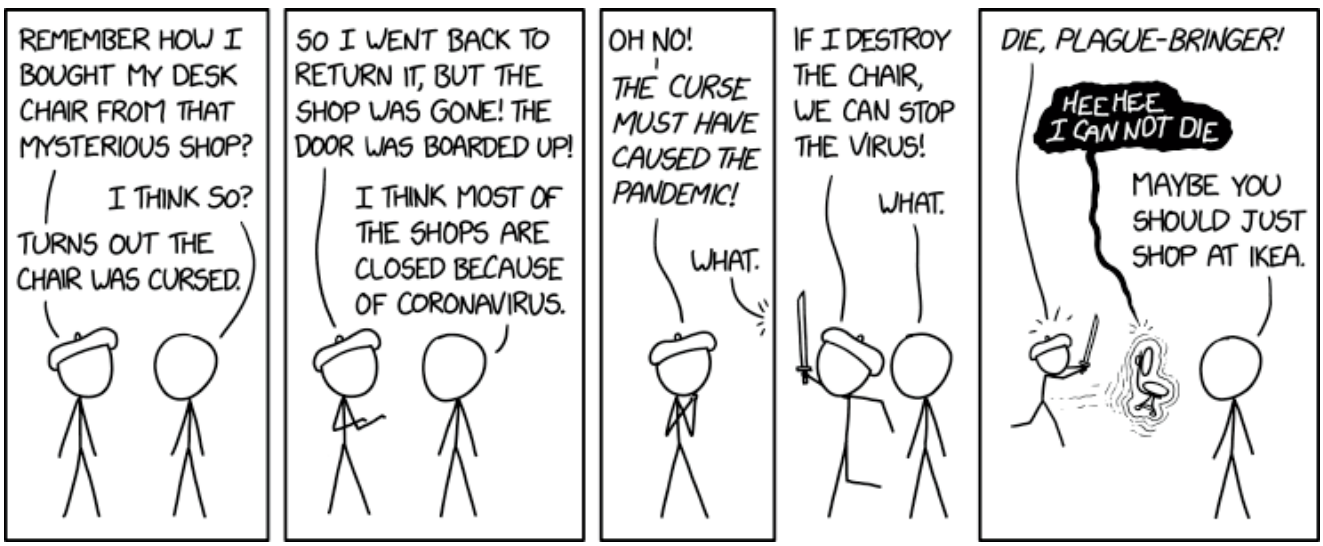
Consider giving a gift subscription to a young person you know who might appreciate SKEPTICAL INQUIRER's content but prefers to read on a digital device—or to a friend overseas.

FUTURE SHOCK COMICS
by Jim & Pat McGreal
ATTENTION EARTHLINGS, YOU HAVE A WEEK TO SURRENDER OR WE'LL EXTERMINATE YOU.
THE TIME HAS COME FOR ALL MANKIND TO UNITE AND DEFEAT THIS ENEMY FROM BEYOND.
IT'S BECAUSE OF YOUR WESTERN DECADENCE THIS HAS HAPPENED!
NO, THIS IS PUNISHMENT FOR YOUR BACKWARD BELIEFS!
HERETICS!
ANARCHISTS!
THAT WAS EASY.
www.futureshockcomics.com
©2018 JMC Studios, Inc.

XKCD

xkcd.com

Cursed Chair


REMEMBER HOW I BOUGHT MY DESK CHAIR FROM THAT MYSTERIOUS SHOP?
I THINK SO?
TURNS OUT THE CHAIR WAS CURSED.
SO I WENT BACK TO RETURN IT, BUT THE SHOP WAS GONE! THE DOOR WAS BOARDED UP!
I THINK MOST OF THE SHOPS ARE CLOSED BECAUSE OF CORONAVIRUS.
OH NO! THE CURSE MUST HAVE CAUSED THE PANDEMIC!
WHAT.
IF I DESTROY THE CHAIR, WE CAN STOP THE VIRUS!
WHAT.
DIE, PLAGUE-BRINGER!
HEE HEE I CAN NOT DIE
MAYBE YOU SHOULD JUST SHOP AT IKEA.

Committee for Skeptical Inquiry

Scientific and Technical Consultants

Gary Bauslaugh,
writer and editor,
Victoria, B.C., Canada

Richard E. Berendzen,
astronomer, Washington, DC

Martin Bridgstock,
senior lecturer, School of Science,
Griffith Univ., Brisbane, Australia

Richard Busch,
magician/mentalist, Pittsburgh, PA

Shawn Carlson,
Society for Amateur Scientists,
East Greenwich, RI

Roger B. Culver,
prof. of astronomy, Colorado State Univ.

Felix Ares de Blas,
prof. of computer science,
Univ. of Basque, San Sebastian, Spain

Nahum J. Duker,
assistant prof. of pathology,
Temple Univ.

Taner Edis,
Division of Science/Physics
Truman State Univ.

Barbara Eisenstadt,
psychologist, educator, clinician,
East Greenbush, NY

William Evans,
prof. of journalism and
creative media, Univ. of Alabama

Bryan Farha,
prof. of behavioral studies in
education, Oklahoma City Univ.

John F. Fischer,
forensic analyst, Orlando, FL

Eileen Gambrill,
prof. of social welfare,
Univ. of California at Berkeley

Luis Alfonso Gámez,
science journalist, Bilbao, Spain

Sylvio Garattini,
director, Mario Negri Pharmacology
Institute, Milan, Italy

Laurie Godfrey,
anthropologist, Univ. of Massachusetts

Gerald Goldin,
mathematician, Rutgers Univ., NJ

Donald Goldsmith,
astronomer; president, Interstellar Media

Alan Hale,
astronomer, Southwest Institute for Space
Research, Alamogordo, NM

Clyde F. Herreid,
prof. of biology, SUNY Buffalo

Gabor Hrasko,
chairman of the European Council of
Skeptical Organizations (ECSO), president
of Hungarian Skeptics

Michael Hutchinson,
author; Skeptical Inquirer
representative, Europe

Philip A. Ianna,
assoc. prof. of astronomy,
Univ. of Virginia

I.W. Kelly,
prof. of psychology, Univ. of Saskatch-
ewan,
Canada

Richard H. Lange,
MD, Mohawk Valley Physician
Health Plan, Schenectady, NY

William M. London,
California State Univ., Los Angeles

Rebecca Long,
nuclear engineer, president of Georgia
Council Against Health Fraud, Atlanta, GA

John R. Mashey,
computer scientist/executive (Bell
Labs, then Silicon Valley), analyst of
climate-change denial, contributor to
DeSmogBlog and Skeptical Science,
Portola Valley, CA

Thomas R. McDonough,
astrophysicist, Pasadena, CA

James E. McGaha,
astronomer, USAF pilot (ret.)

Joel A. Moskowitz,
director of medical psychiatry, Calabasas
Mental Health Services, Los Angeles

Matthew C. Nisbet,
professor of communication studies,
public policy, and urban affairs at North-
eastern University

Julia Offe,
neurobiologist, science journalist, creator
of German Science Slam

John W. Patterson,
prof. of materials science and
engineering, Iowa State Univ.

James R. Pomerantz,
prof. of psychology, Rice Univ.

Tim Printy,
amateur astronomer, UFO skeptic, former
Navy nuclear reactor operator/division
chief, Manchester, NH

Daisie Radner,
prof. of philosophy, SUNY Buffalo

Robert H. Romer,
prof. of physics, Amherst College

Karl Sabbagh,
journalist, Richmond, Surrey, England

Robert J. Samp,
assistant prof. of education and
medicine, Univ. of Wisconsin-Madison

Steven D. Schafersman,
asst. prof. of geology, Miami Univ., OH

Chris Scott,
statistician, London, England

Stuart D. Scott Jr.,
associate prof. of anthropology,
SUNY Buffalo

Erwin M. Segal,
prof. of psychology, SUNY Buffalo

Carla Selby,
anthropologist / archaeologist

Steven N. Shore,
prof. of astrophysics, Univ. of Pisa, Italy

Waclaw Szybalski,
professor, McArdle Laboratory, Univ.
of Wisconsin–Madison

Sarah G. Thomason,
prof. of linguistics, Univ. of Pittsburgh, PA

Tim Trachet,
journalist and science writer, honorary
chairman of SKEPP, Belgium

David Willey,
physics instructor, Univ. of Pittsburgh, PA

Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON

Subscribe or order back issues at skepticalinquirer.org

CENTERS FOR INQUIRY
www.centerforinquiry.org/about/branches

United States Branches

CFI Austin
Austin, Texas (512) 454-0977
austin@centerforinquiry.org

CFI Indiana
350 Canal Walk, Suite A
Indianapolis, Indiana 46202
(317) 423-0710
indy@centerforinquiry.org

CFI Long Island
Long Island, NY
(631) 793-9382
li@centerforinquiry.org

CFI Michigan
PO Box 3534, Grand Rapids, MI 49501-3534
michigan@centerforinquiry.org

CFI New York City
P.O. Box 26241, Brooklyn, NY 11202
nyc@centerforinquiry.org

CFI Northeast Ohio
PO Box 2379, Akron, OH 44309
(330) 798-0843
neohio@centerforinquiry.org

CFI Portland
PO Box 3378, Portland, OR 97208
(503) 593-7904
portland@centerforinquiry.org

CFI San Francisco
San Francisco, CA, sf@centerforinquiry.org

CFI Tampa Bay
Box 139 c/o O'Keefe
4011 S. Manhattan Ave., Tampa, FL 33611-1265
tampa@centerforinquiry.org

CFI Washington DC
1012 14th St. NW, Suite 205, Washington, DC 20005
(202) 733-5279 ext. 200
dc@centerforinquiry.org

CFI West
2535 W. Temple St, Los Angeles, CA 90026
(323) 666-9797, la@centerforinquiry.org

CFI Western New York
1310 Sweet Home Road, Amherst, NY 14228
(716) 636-4869 ext. 402
wny@centerforinquiry.org

International Branches

CFI Argentina
Los Antiguos, Santa Cruz Province,
Argentina
Alejandro Borgo
alejandroborgo@gmail.com

CFI Canada
PO Box 24006
Hazeldean RPO
Ottawa, ON
K2M 2C3
(613) 663-8198
info@centerforinquiry.ca

CFI China
China Research Institute for Science
Population
NO. 86, Xueyuan Nanlu Haidian Dist.
Beijing, 100081 China
8610-62170515
Zheng Nian
nzhjx@yahoo.com.cn

CFI France
Universite of Nice
Faculte Des Sciences
Parc Valrose, 06108
Nice Cedex 2, France
+33-489.15.02.28 (only on Wed. p.m.)
Henri Broch
Henri.Broch@unice.fr

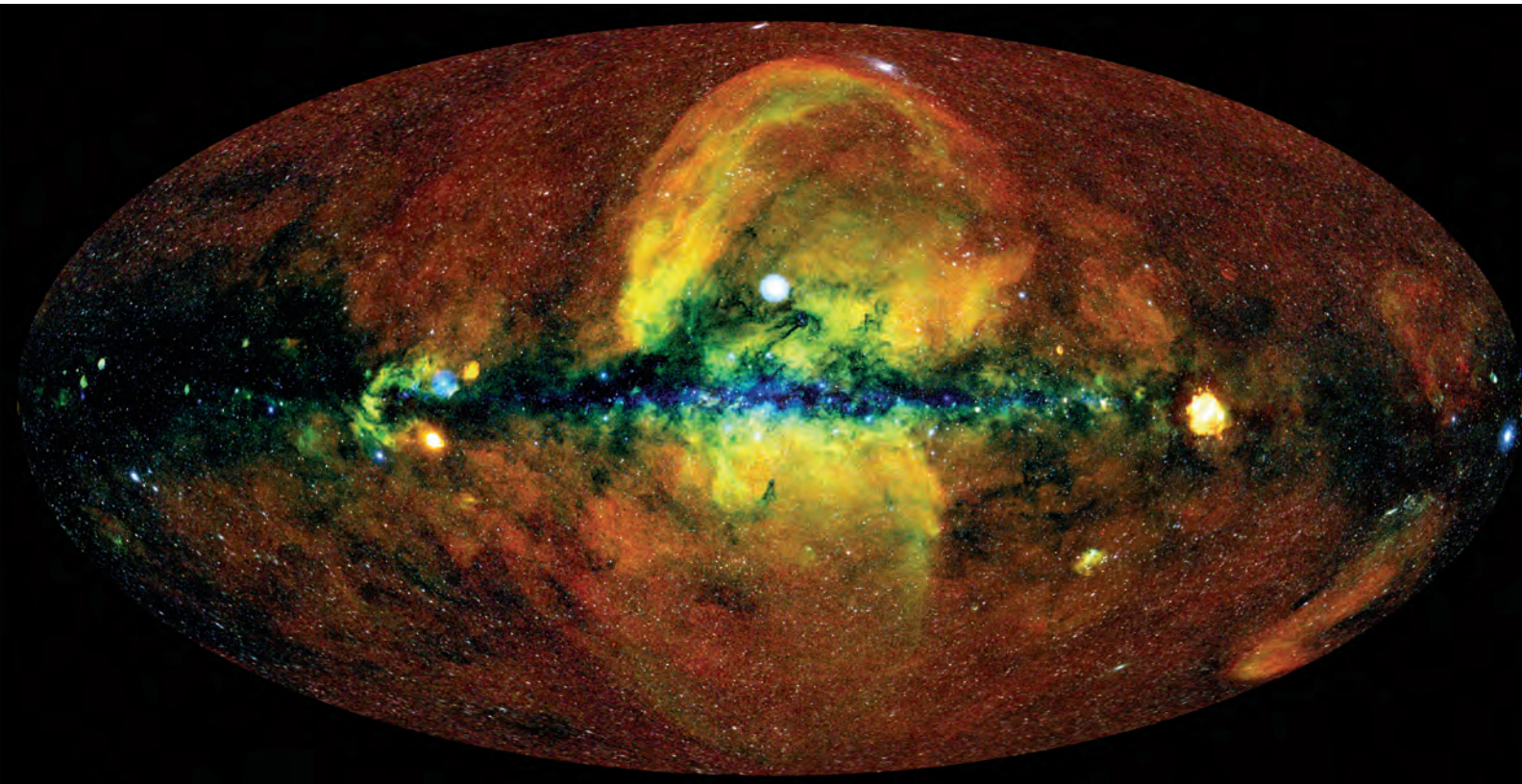
CFI Kenya
Center For Inquiry–Kenya
United Youth Group House, Wing B
Makadara, Jogoo Road
Kenya
George Ongere
geongere@yahoo.com

CFI Peru
Calle El Corregidor 318
Urb. El Manzano, Rimac
Lima 25-PERU
Manuel Paz y Mino
humanarazon_peru@yahoo.com

CFI Poland
01-876 Warszawa
Ul. Broniewskiego 99/147
Poland
Andrzej Dominczak
dominiczak@wp.pl

CFI Spain
Madrid, Spain
Luis Alfonso Gamez
lgamez@terra.es

cfi CENTER FOR INQUIRY



OUR DEEPEST VIEW OF THE X-RAY SKY

The first all-sky map from the eROSITA X-ray telescope of the hot-energetic universe contains more than one million X-ray objects, roughly doubling the number of X-ray sources discovered over the sixty-year history of X-ray astronomy. The image, which required 182 days of observation, was completed June 11, 2020, and released on June 19. It reaches about four times deeper than previous all-sky X-ray surveys. Most of the new sources are active galactic nuclei at cosmological distances. The eROSITA X–ray instrument was developed and constructed by Germany's Max Planck Institute for Extraterrestrial Physics (MPE) and launched July 19, 2019, aboard the SRG spacecraft, a joint Russian-German science mission.

Credit: Jeremy Sanders, Hermann Brunner, and the eSASS team (MPE); Eugene Churazov, Marat Gilfanov (on behalf of IKI)

More Information: http://www.mpe.mpg.de/7461761/news20200619